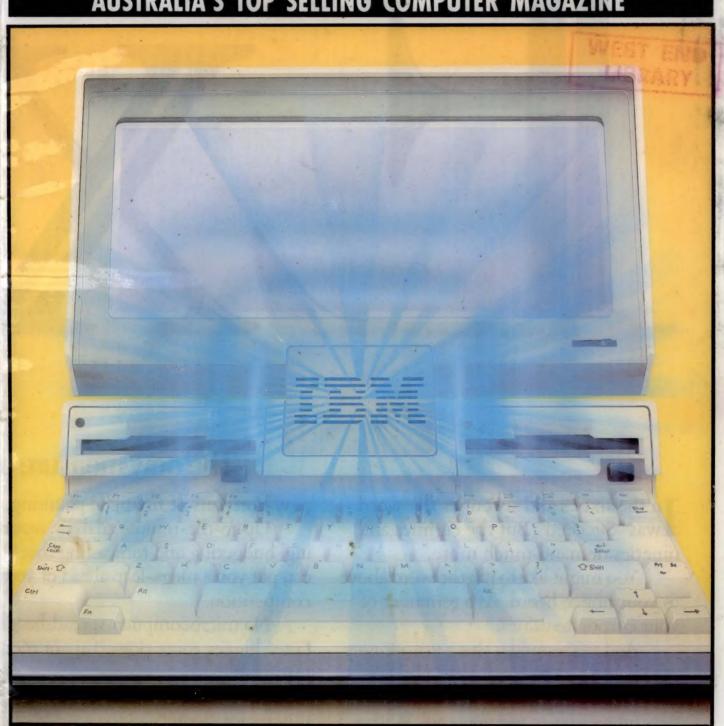
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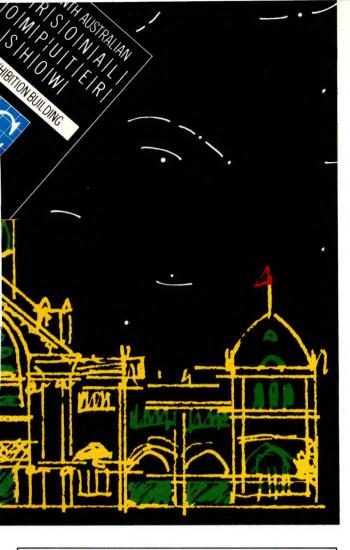
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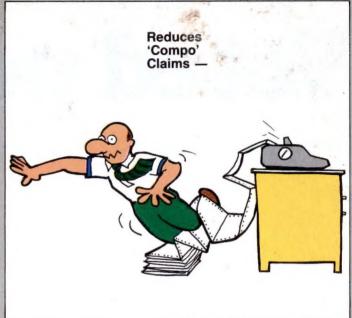
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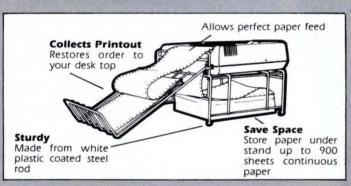
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Disappointing though the West Coast Computer Faire may have been, there were some items of interest.

Guy Kewney reports.

All the fun of the Faire

Despite fears that it would be a waste of time. I visited the eleventh West Coast Computer Faire. It proved to be an excellent trip. I found PC Outline, a 'shareware' outline processor costing \$US10, which is very much better than Think Tank, I found the latest version of PC Write, another shareware product and a wonderful word processor. A chip designed to run Forth (the chip designed by the man who designed the language) was available in a kit for \$US400. There were lots of assemblers, editors and compilers for every conceivable type of micro. And IBM was there, with its Convertible.

Nonetheless, the show is a shadow of what it was. Silicon Valley, where all the micro companies have their roots, was where all the new ideas came from. Adam Osborne, four years ago, announced his revolutionary 'portable' CP/M machine. Microsoft always hosted a vast party. The media gave their biggest 'award' parties. Thousands (literally) of small entrepreneurs showed their bright new ideas in tiny lemonade-stall booths, hoping that next year they'd be hosting a big party on the profits of fame. For some, it even happened.

Two years ago the Faire was in a state of terminal decay, having been sold by its original founder and

organiser, the enthusiastic amateur Jim Warren, to Prentice-Hall, a group of 'professional' conference organisers who wanted to make it a business-only show. This year, almost on the point of vanishing into oblivion, the Faire was taken over by another professional show organiser, Interface Group. Interface is no stranger to big, boring business conferences, and all the Silicon Valley

enthusiasts shuddered at the thought of what might happen.

Amazingly, the signs are good. The first thing that the Interface Group boss, Shelley Adelson, did was to hire Jim Warren and enlist his help in putting the oldstyle show back together again. Warren must love the show, because he agreed. He made (I guess) two million dollars selling the show to Prentice-Hall, and has been using some of that money to run a vigorous campaign, aiming to be elected County Supervisor and stop the 'extortion' of money out of poor countrydwellers (like him) by a rapacious San Mateo County

Planning office. (In fact, unlikely though it may sound, he seems to have a point. The Board of Supervisors recently voted to make the use of plastic plumbing pipe illegal in country areas — it's a 'fire hazard', they say — even though town-dwellers can use it. There are more votes in town...)

His first bit of advice to Shelley Adelson was: 'You've got to give something back.' The next thing he advised was: 'Keep the conference sessions.' Amazingly, the old days, when people queued up to present papers to the Faire, had almost gone, with the previous organisers downgrading the major attraction simply because it didn't make a profit on its own.

To everyone's amazement, including that of writer Jerry Pournelle, Adelson seems keen to do this. 'This is my favourite show,' Pournelle told a huge audience of adoring computer nuts from the Bay Area, and everyone applauded — me, too. It's great to see some hope for the future of this show after two dismal years, and I look forward to next year's Faire. Guy Kewney



The price of optical character recognition units has, and will continue, to fall. This one from Remington sits neatly between a PC's main system box and monitor.

The PC-Scan takes approximately 25 seconds to process a typed page and its output is compatible with most word processing programs. Remington sells it for \$7800; call (02) 269 0925 for details.

PC Outline

There was a time when using an outline processor meant that you were more concerned with what you wrote than how it appeared on paper. With the arrival of PC Outline on IBM machines, this is over: this outliner is a lot easier to use than many word processors, is infinitely more powerful,

and is vastly faster.

An outline processor can be intricate and complicated: PC Outline proves that its job is simple. An outline is like the contents page of a book. The clever part of an outline in a computer is that you can read the chapters without moving off the contents page. Each chapter can be a contents page of its own, and you can see that as a series of headings, or as a series of paragraphs. It makes planning a long piece of text very simple, because you can plan and write at the same time. As the plan changes, you turn sub-heads into major heads, turn major headlines into footnotes, and shuffle them around.

With PC Outline, you get something else - you get nine different outlines at the same time. One can be all over the screen, hiding the others. Then again, it can occupy just the top righthand corner, or any other part of the screen. Others can sit next to it, or can be above it or below it. You can see all of them, if you like. Switching from one to another is like using Microsoft Word: you just move from one window, instantly.

PC Outline is a lot quicker than Word. Alt-1 shows window one. Alt-2 shows window two - and so on bang! One of my windows now contains my name-andaddress list. At a splitsecond's notice, I can find the phone number of anyone (if I have it on file) and a second later, I can add a new one. The list, however, isn't just a long file: all you see when you look at it, is the names. Search for one. however, and the sub-heads open up, showing phone number, names of executives, when you wrote about it, and (in emergencies) what you said about it - all hidden until needed.

Unlike other outliners, PC Outline can use as much or as little memory as you like. I'm currently loading the program with the instruction which sets it to use just 300k out of the 640k on

the Olivetti M24, leaving just over 243k free after the operating system has been squeezed in.

Now, the crunch: PC
Outline can be used as an ordinary program, or it can be used memory-resident.
Memory-resident programs, such as Sidekick, allow you to load and run other things—communications programs, spreadsheets, text editors and even outline processors—but with the magic option that if you press a certain key, suddenly you're running Sidekick—or, in this case, PC Outline.

The text editing capabilities are excellent. You can't type fast enough to stop PC Outline from reformatting a paragraph as you type. Finding any string anywhere in the file takes a split second. The print options are vast, easy to understand, and simple to

operate. What word processor can you say that about?

You can create macros (keys which type whole sentences), and you can arrange for macros used in another program to be dropped when you switch to PC Outline.

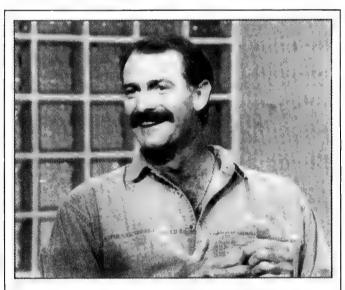
And if that isn't enough, there is the price. A fullyregistered, paid-up user, entitled to the manual, full telephone support, and any program updates, pays an amazing \$US49.95 plus \$US5 shipping charge. But the program is not copyprotected, and indeed, the whole concept of 'shareware' requires that it should be not only copyable, but copied. 'In fact,' says the opening screen when you sign on, 'we encourage copying. The diskette can be freely copied and shared. We also encourage you to

register your copy. With registration you get the most recent version, a typeset copy of the manual, automatic notice of future program updates, and telephone support.'

Dave Winer, author of the US's seminal outline processor. Think Tank, told me he was 'really upset' that the author of PC Outline hadn't come to him. Apparently, the man had been touting this excellent program around all the publishers in the world, and eventually went for shareware as his marketing basis simply because he had no options. 'We could have used a really able technologist like this guy,' said Winer sadly. I can see his point. Up until receiving this product, I used his. I've now deleted Think Tank from the hard disk.

But Winer advertises
Think Tank. On the Macintosh, he hardly needs to—
it's an excellent outliner, and almost the only act in town.
On the PC, however, even though (sorry, Dave) his product is, by comparison with PC Outline, a bag of worms—full of bugs, slow, disk-hungry and primitive—he will nonetheless outsell PC Outline, simply because PC Outline doesn't have an advertising budget.

Anyone who wants a copy on a 5.25in diskette, send the disk to me with a sufficient quantity of stamps and a strong disk holder, and I'll be delighted to make a copy (as soon as I have time, and as soon as I get around to it) for you to try. Those without infinite patience write to SoftWorks Development, 750 Stierlin Road, Suite 142, Mountain View, California, 94043, and send your \$U\$55. You won't be sorry. Guy Kewney



Dennis Lillee has been dumped from Ray Martin's Midday Show using Mitsubishi's Video Printer.

The printer plugs into any TV, video recorder or PC. It will produce a monochrome dump of whatever is displayed on the TV (or output from a VCR or PC) onto thermal paper. Plasticised paper can also be used for greater durability. It's reproduced in actual size here.

Other features include multiple copies through its ability to store images; negative prints; compatibility with a wide variety of voltages; and compatibility with a variety of video signal standards including NTSC and PAL. On its way is a larger printer capable of printing A4 sized screen dumps.

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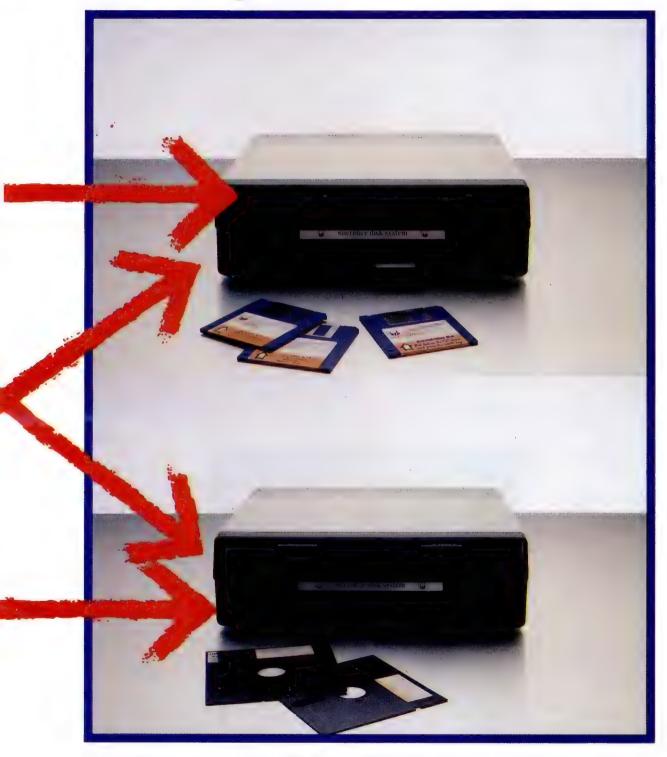


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vant and slow, the micro business is, today, overlooking a revolution in the data processing field — a revolution which is not a couple of years away, but just a couple of months.

The name of the new family of products is 'information appliances'. They are the invention of Jeff Raskin, who set up a venture-funded California company called Information Appliance Inc. to develop them. I've just seen them. and I am amazed. Raskin has as good a claim as anyone to be the man who made Macintosh happen for Apple. He took several ideas, including Alan Kay's windowing, mouse, icons and Smalltalk ideas, and put them together into the Book of Macintosh inside Apple. Several years later, Apple laboured, and brought forth the beast.

Today, Raskin reckons and I agree — that he has gone several steps forward. simply by stopping himself from making computers. You can get an idea of what he's done by trying out his Swyftware on the Apple IIe. Swyftware is a disk. It includes software on the Apple, plus all data, and is 'autocloning'. What does it do?' It does word processing. It does information retrieval, telecommunications, calculations, and even allows you to use the Apple as a programming environment,' adds Raskin, 'without menus, without mice, without windows, without function keys. It only has five commands, and it breaks all known principles about the way things are done these days.' What makes the whole thing sound incredible is that it takes 16k of code. And it is fast, fast, fast the fastest thing you've ever seen on an Apple IIe.

A computer, Raskin notes, is 'a device for running programs.' He isn't building one of those; he's making devices with very specific functions. He claims to have a spreadsheet function device ready, but I didn't see

that: what he showed me was the text/data/comms/Basic machine, in his home in a small concert hall high in the Los Altos mountains, south of San Francisco. After he told me what it was, I must have looked a little sceptical. 'Come and see,' he said.

I sat at his elbow and he showed me the Apple screen. 'This isn't the appliance,' he explained. This is a program to run on the Apple which looks like the appliance. The real appliance is very much bigger, and faster.' It's hard to imagine how it could be bigger and faster. The screen was covered in 80column text, and Raskin pointed to the cursor, 'Show me somewhere on the screen,' he said. I pointed to a word near the bottom. Without cursor controls or mice, the cursor leaped to that point. The magic command is 'Leap', and it works a little like a Find/ Replace command in word processing. The difference is that the computer doesn't wait, dumb and idle, while you type in the search pattern, but starts immediately.

For example, suppose the word 'where' is at the bottom of the screen: you hold down Leap and start typing the word. As you type the 'w', the cursor leaps to the next 'w' onscreen. When you add the 'h', it has moved immediately to the next occurence of 'wh', and normally, within three letters, you're there.

With cursor keys, you'd have to think: 'I could hold the 'down' cursor until I reach the bottom line, then I could hold the right-arrow. Or faster, I could do a 'move-to-end-of-line' command, and go back five spaces. Or a 'bottom-ofpage' command, up two lines, then back. Now, what is the bottom-of-page command - control-downarrow? Or PgDn? With a mouse, you have to take your hands off the keyboard. Few typists enjoy this.

As Jeff Raskin said: 'I find

a hand-to-mouse existence very annoying.'

It sounds too simple to be clever. Wait till you see it, though. You can leap to letters, characters, carriage returns (which always appear at ends of lines), double carriage returns (paragraphs), and numbers. How do you format a disk? You don't. Put in a disk and press the 'disk' key. The data in the machine is transferred onto the disk. while formatting (if blank) in around eight seconds. Should the disk be already Swyftware-formatted, it won't let you transfer the data until you highlight the bit you want to transfer (that could be the whole disk). And it certainly won't let you abandon the previous disk without saving any changes.

File names? There are none. 'We have known for 30 years that file names don't work,' said Raskin. The two times you want to use them is when you have an idea and want to start putting it down, when it gets in the way, and the other time is when you try to retrieve the idea, and can't remember the file name you gave it last week.' But you can remember that it was a note from Bruce, a comment on a Porsche, or some other key word. It may even be a letter you wrote on 26 May, So: Leap! Hold down the Leap key and type 'Porsche', and no matter where it is on the disk, you'll have that in front of you in less than 300 milliseconds.

Possibly, there were two letters on 26 May: press Leap again, and you find the second. And it really works.

'One of the principles we worked on was that frequently chosen tasks should be very fast; less frequent tasks should take longer,' Raskin says. The command to operate a modem is 'Send' and the command to operate a printer is 'Print', and the system can cope with incoming electronic messages while the user is typing in text. This is something only possible



\$2995 will buy you one Leading Edge Model D PC-compatible. It comes with dual 5% in floppies, 256k of RAM, "hi-res" monochrome monitor, Hercules graphics emulation capability and a bundle of software. It seems to be causing a bit of a stir in the US; naturally its Australian distributor feels it will do the same here (predicting a 10% market share within 12 months). Call (02) 958 2197 to get the full story of the distributor's enthusiasm.



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because there is no operating system.

The normal approach is to take this great, big, ugly thing called DOS, and put a cosmetic thing over it to make it seem friendly,' says Raskin, 'We've junked the whole concept."

An awful lot of people who ought to be taking this concept seriously are refusing to consider it, because they simply don't believe it.

Others are doubting its usefulness. Their attitude reminds Raskin strongly of the time when the mainframe business ridiculed the concept of minis, or the time the minicomputer business dismissed micros. Measure the information appliance by microcomputer requirements, and it doesn't measure up. But Raskin likes to recall the Benchmark he proposed, once, to a minicomputer maker. 'OK, your machine will win a floatingpoint Benchmark. My turn. Pick up your machine, and I'll pick up mine, and we'll time how long it takes each of us to get to the door.

You measure the appliance by the number of things a user can do with it, without having to wonder what the difference is between a data disk and a program disk; or by the speed in which the screen jumps from one page to another; or by how few commands the user absolutely has to remember to get information in and out. Raskin set out to have 10 commands ('it was enough for Moses') and claims to have got it down to five -Leap, Calc, Disk, Send and

Rigorously, you could argue that there are other commands (if you like to call them that) which are typed in and executed with the 'Calc' key. Turning the screen from 80-column width to 35, for example, involves typing 'width=35' and pressing Calc. The operation is virtually instant. Double-spacing is similar.

Raskin doesn't believe his appliances will replace computers. 'People will need to have computers to run programs. For example, you could use an information appliance to send the same letter to 25 people, by simply leaping and inserting commands. But for a longer list, you'd want a mail-merge program,' he said. On the other hand, he does believe there is a bigger information appliance market than a micro market, and there are surprising opportunities for the use of information appliances outside offices.

Without breaking confidences. I can't describe what Raskin showed me in detail. but his plans for numerically controlled (NC) three-plane working machinery invove a breakthrough that will destroy existing pricing. It won't just take 20 per cent or 30 per cent off current prices, it will mean that equipment which costs \$20,000 now, will cost \$5000 by the end

of the year.

The Apple-based product, useful and powerful though it may be, is not the real appliance. That will be out, in two (possibly three) forms later this year. Raskin has been financed by venture capital to the tune of \$US5.6m in two rounds, the second coming in June 1984 (when no-one else was getting venture funding, he points out), 'After three vears, we still have half the money left in the bank, and have always been within 5 per cent of budget. 'Unusual,' he remarks, 'but perhaps not newsworthy."

Impressive though that finance may be, it isn't enough. To produce and launch on a sufficiently large scale, information appliances would need tens of millions, even hundreds — and that isn't available. Therefore he is licensing the designs to 'another group'.

The first two prototypes are in Raskin's home, and I saw them. One is batterypowered; both are portable. They have a Motorola 68000 processor, and instead of the 40k provided by the Apple II, they offer

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exactly the same speed in 240k. That's a lot of text. The \$US800 appliance will include a modem and a disk, and optionally, a printer. There is no on/off switch you just start typing. The mains-powered version has a video screen (white, with black type) and the battery version has an LCD screen.

In a couple of years, Raskin predicts, all the people who are today dismissing the concept as ridiculous, will be building and selling information appliances. 'It's a new market, that's all.' His preappliance sells for \$US80 on an Apple IIe. You need a single disk, an 80-column extended card, serial and parallel cards, plus a printer and a modem. For those of you without those things, it's almost worth buying them, just to try out the idea. It's amazing. Guy Kewney

Share and share alike

Shareware — software that is free, and you pay for it if you like it — was the second most obvious trend at the Faire. It's a way of making a little money, for a software author, with the hope that one day, when the program catches on, you may make quite a lot.

For the author of PC Write, Quicksoft, the dream is starting to come true. It has staff, the beginnings of an income, and thousands upon thousands of users who simply made a copy and decided that they didn't need a manual, so never bothered to register.

Quicksoft charges \$US75 for a registered copy of PC Write, and has just launched the new 2.6 version.

This is a complex product in terms of what it can do that is, it can do just about anything. If I start listing its features, this issue of APC won't be printed, and I'll leave out five or six items that you, probably, would regard as vital. But a colleague who is using it has stars in his eyes, and says it does everything! It even allows you to specify what code will mean 'end-of-file'. and as a registered user, you get the source code to allow you to change the program vourself.

Quicksoft is contactable on (206) 282 0452, in Seattle, Washington.

Another new 'shareware' package is the database, File Express.

This program is just one of many which makes pundits gloomy about the chances of survival for fringe database producers such as Infocom, with the struggling Cornerstone.

File Express is not only virtually free, but it has been described as 'really easy' to use by serious reviewers, and seems to have rather more features than rival products such as PFS: File, or Executive Filer.

The producer, Express-

ware, is in Redmond, Washington. Details on (206) 481 3040.

If shareware was the second most obvious trend at the Faire, the most obvious trend was 'shells' for IBM PC-DOS — programs to guide non expert users through the minefield of copying, directories, formatting and filenames.

The same thing is now possible on IBM micros, with assembly language, through an 8086 interpreter of assembler instructions from Morgan Computing.

Advanced Trace 86 has annoyed the pundits by not being entirely compatible with Microsoft's assembler program — code developed on it has to be edited before it will be accepted by Microsoft's program.

The author, Morgan Computing, poo-poohs this: 'We include a nice little utility program which strips off the first field in our output, which is the actual machine code,' staff said — and apparently, the numbers in this field are the only incompatibility.

There is one product which is both shareware and DOS shell: Dosamatic, which was shown by enthusiasts.

Dosamatic is like Xtree, which does a good job of guiding you through the problems normally associated with trying to manage IBM's disk operating commands. Others under this heading include JOBS, from RCT Design, Q-DOS (or QuickDOS), and Jobs, from

RCT Design.

Details of Dosamatic are available by contacting Steve Mykytyn through Compu-Serve at userid 72447, 2372. 'As in the past,' the company notes, 'you may write or call Mann Pacific Software.' Unfortunately, I don't have this company's phone number.

If arrogance is a sign of quality, PathMinder must have been among the better shells at the show, I can't confirm this personally, because the arrogance of this Austin, Texas company extended to the point where it informed me that it 'didn't know what it was you have to do to register as Press for these shows, but it seems just anyone can get in and ask for free software.'

A pity, because Path-Minder is memory-resident, and the one thing I do ask from a DOS shell is that I don't have to interrupt a program, close down all the files and find the shell, before moving a file from directory A to directory B. I'll be contacting the company for more details just as soon as my temper recovers.

The price of PathMinder is \$US40, and details are on (512) 474 4666.

QuickDOS, at \$US30, is available from Gazelle Systems in Utah, on (801) 377 1288.

There was once a mouse which originally started out as a better mouse: its inventor called it a 'hedgehog' because of the buttons sticking out. The name,

Assco stand's behind Hewlett-Packard



See Hewlett-Packard calculators, computers and plotters at Stand 108.



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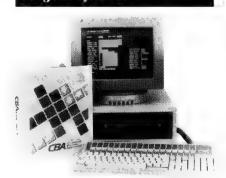
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Peripherals
EXPANDING COMPUTER POWER

however, didn't stick. So, if you can't build a better mousetrap, how about a better mouse interface? Logitech, the Swiss-based originator of Modula and the Logi-Mouse, has picked Lotus 1-2-3 as the way to do exactly this.

The company demonstrated an interface 'which totally integrates our mouse into 1-2-3, at the Faire.

'It eliminates the jerky cursor movement and the annoying delays and beeping you get with other mice," Logitech claimed, adding: 'It makes 1-2-3 look like a mouse-based program.

Other software uses a new piece of utility programming to use this mouse: this 'automatically' customises the mouse for any business graphics, or CAD application.

The arguments for and against Basic are often not about Basic at all, but about the convenience of having a Basic interpreter always ready to run, however much of the program you want to write.

For the ability to run a test section of code backwards. that seems a small price to pay. The company is based

in Texas, in Carrollton. Details on (214) 245 4763.

The kind of job that we most earnestly need a computer to do is a dull, mindlessly repetitive one which has to be done exactly right every time.

Operating a spreadsheet is exactly this kind of task. One of the things Lotus 1-2-3 users like about the package, is that the sequences of keystrokes which make using it a chore can be automated. These are called 'macros', and the development of a useful macro to move one cell over, two up, enter a standard formula. pause for a number . . . and so on - working it out can be complex.

That, in a nutshell, is what Macropac International is hoping to make money out

The company has a disk which contains '101 macros for Lotus 1-2-3'.

The macros included are a kind of folklore, presented in such a way that both novice and intermediate 1-2-3 users can benefit from someone else's experience,' says one reviewer, quoted by the company.



A lot of people will remember the Dick Smith Challenger, (and for a variety of reasons), especially those who bought one of them. Well, the UK company which produced the machine has now set up in Australia and is about to begin marketing PC, XT and AT compatible machines. In fact, they'll even soon be made in Australia. Prices start from a very attractive \$2395 including some bundled software. Ferranti's telephone number is (02) 698 5544.



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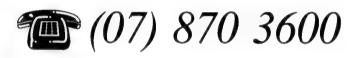
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Macropac International is in Cupertino, California. Details can be obtained by writing to 19855 Stevens Creek Blvd, Suite 168, Cupertino, Ca 95014. Price is \$US50.

Typically, local area nets cost upwards of \$US600 per user extra, on top of the cost of their micros. Can there be a true local area network, costing \$US99 per node? 'A wild claim,' said the experts.

The claim was made by Applied Knowledge Groups, for Knowledge Network. The product was unveiled at the show, and its claims are compelling enough that I think we seriously ought to try the system out in our offices.

Briefly, the idea is to use the standard serial ports in IBM micros, and wire them together through phone jacks.

The Ethernet principles of a collision detection system are used.

If the net can run at only 57 kbits per second at its quickest, it is far from the fastest local net, but for sharing printers, disk space and programs, the price, at least, is right.

The company is based in Mountain View, California, tel: (415) 965 1300.

If Unix is pushed down all our throats, it won't be the first time that a need for common standards has forced a step backwards in computing. Ben Rosen, American financial guru, says it 'is not a personal

operating system.' Those who agree with him now have to analyse Wendin's \$US99 product, PC Unix, launched just before the Faire.

Behind the low price is a secret; the secret is that Wendin has not paid for a Unix licence.

Its version of Unix runs MS-DOS programs, and offers multi-user and multi-tasking facilities, as well as the 70 Unix commands which Wendin regards as 'the most commonly used features of Unix.'

With this version, unlike official Unix versions, you get the source code, which can make life easier for a professional programmer writing software for your system. And Wendin has shrunk it down so that 'the entire system is packaged on four diskettes, and requires approximately half an hour for a typical user to install,' says the company.

Furthermore, 'it requires so little storage space, it can be installed and run on a 5Mbyte hard disk. By contrast, comparable Unix operating systems for the PC are on 25 or more diskettes, and require as much as 13Mbytes just to store the system.'

At the same time, rival firm Microport was offering a genuine Unix V, licensed from AT&T, and available for the chips in the AT and compatibles.

This is cheeky. Microsoft has announced that its latest Xenix is compatible with

Unix V, but AT&T recently annoyed Microsoft immensely by saying that it isn't. Microsoft just went public and (in the States at least) can't issue ripostes.

Wendin is contactable on (509) 235 8088, and Microport is on (408) 688 0286. I think those phone numbers (8088 and 0286) must be collectors' items in Silicon Valley.

Two years ago, a colleague returned from California with a personalised message, Macintosh-generated, on her tee-shirt, and ever since, my people have been asking: 'Where can we get a ribbon with tee-shirt ink?'

The answer is: Underware, a company in Sunnyvale.

The company now has ribbons for printers other than the Apple ImageWriter: the list includes the NEC 8023, the Epson MX and FX, the Star Gemini, and the Okidata Microline.

The ink is printed in reverse on special paper, and transfers (iron-on) to fabric.

The new MacPlus is faster than the old Mac, but I still can't get one. For Macintosh owners with little patience but plenty of cash, Levco has introduced an 68020 add-on board.

The Prodigy 4 is not cheap: the company was curiously coy about exactly how much it would cost. Best estimates are around the \$US4000 mark.

But it does speed up the Mac, says Levco, and what is more, it allows

an enormous amount of memory to be added. And in order to prove how compatible with the standard Mac it is, the company hired every conceivable demonstrator for every known software company to spend time on its booth running its software.

It was fast — apparently, four times the speed. It looked like at least that.

More fascinating, though less obviously epochmaking, was Levco's nonrotating fan.

This product has a price: \$US60 for a kit, \$US70 installed. It uses a piezo-electric quadrature technology: the material changes the shape when power is fed into it. The blades 'flap' fast and (apparently) silently.

Details from Levco in San Diego, on (619) 457 2011.

Detractors of Amstrad's 'old-fashioned' 8-bit micros point out that you can get marvellous pop-up utilities such as Sidekick for the IBM family, but not for CP/M.

This is no longer true: a 'Sidekick for the Amstrad' is possible, after all. A product from Poor Person Software is now available in CP/M Plus version.

The product costs a low \$US50, and provides a notepad, a directory manager, a calculator, a modem driver for simple comms down the phone, a calendar and a hex calculator. There is also a key definer: you can feed macros in, like Smartkey (something Sidekick can't do).

Assco stand's beside AutoCAD

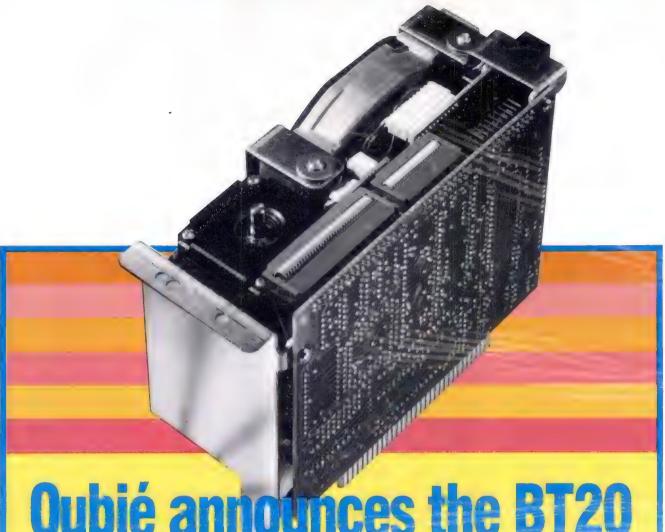


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Details of Write-Hand-Man on (425) 493 3735.

I wasn't surprised to find that neither Atari nor Commodore showed up at the Faire, leaving publicity to local user groups, although I had expected more evidence of the Atari ST range. Staying away was a mistake neither Apple nor IBM made.

New products for the Amiga, however, were in evidence, with the most impressive being a whole catalogue of launches from Micro Forge.

These products are mainly upgrades for the Amiga hardware. Products include a seven-slot expansion system, a second diskette drive. twin MS-DOS disk drives (5in) shown working with the MS-DOS emulator, plus hard disk and memory expansion — all a lot cheaper than rival products.

Micro Forge says all products are available now (May) and will send price lists. Details on (404) 688 9464, in Atlanta, Georgia.

Atari should have shown its Mac-emulating cartridge. Computer Club, which sponsored a symposium (I didn't attend) with Sam Tramiel, president of Atari, speaking. The cartridge is 'not a but it does allow, says the

It was represented at the

Faire by the San Leandro

complete emulation system,' Club, more than 1000 titles already written for the Apple Macintosh to be transferred to 1 Mbyte STs without modification. And, the Club adds, the programs then run around 20 per cent faster.

Anyone wanting to set up links with the Club can contact the president. Bob Barton, on (415) 352 8118. The cartridge details are with Data Pac Inc. on (213) 821 2623.

Convertible software

Borland International is one of several companies which have already hopped into converting their range of software to the 3½inch disk format used by IBM's new convertible laptop PC. Borland programs (including Reflex and SideKick) should be being shipped by the time you read this. Existing owners of Borland software will be able to purchase 3½inch disk versions of their programs for a nominal sum. Owners will not have to return their 51/4 inch disks in order to transfer to the convertible format.

Amiga now PC compatible

Commodore is taking the Amiga to its limits by announcing a new hardware device called Sidecar, allowing the Amiga to run PC software.

Sidecar, which is actually a cutdown PC, connects to the Amiga via the interface slot and happily runs Flight Simulator, Lotus 1-2-3 and other PC applications.

With 60 software titles for the Amiga already in Australia, and another 68 expected in a couple of months, Sidecar will open the door to a wealth of PC business software currently available.

Sidecar has a stock standard 256k RAM, 51/4in floopy drive and has three spare slots available for hard disks, communications cards and so on.

Sidecar is represented as an icon on the Amiga's screen and by clicking the mouse's cursor immediately boots the system into PC mode enabling the user to switch from pretty graphics to 1-2-3 instantaneously.

Manufactured by Commodore in Hong Kong, the first shipment of Sidecar is expected in Australian stores sometime in June and should sell for approximately \$699.

Some details of Atari's PC emulator for its 1040ST are included in the Seventh Australian Personal Computer Show preview elsewhere in this issue, but APC has been unable to get its hands on one by press time. Watch for a comparison of the units in a future issue. Maria Bokic

The coming

Producing compatible software may become as big a business as making PCcompatibles, forcing software prices down in the same way that 'me-too' machines have forced the market leader, IBM, to drop its PC prices (or offer rebates, which seems a feeble way to sidestep any claims that competition has forced IBM to lower its prices). In the US, SoftKlone Distributing Corporation is selling Mirror, a \$49.95 knock-off of Crosstalk 16 (retailing for \$195). And Adam Osborne is having some success with his Paperback Software International, a company which includes in its product range VP-Planner a \$99 clone of Lotus 1-2-3.

In Australia, Micro Data Management Systems has picked up the distributorship for a range of dBase clone products, all selling for less than Ashton-Tate's prices and/or claiming vastly improved performance and features.

MDMS has dBase-clone compilers for dBasell and III; and a dBaseIII Plus-clone is expected in June. Call (02) 745 1995 for pricing.

Creditors' delight?

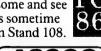
The official liquidator for Computer Edge has called a meeting of creditors of the failed company following its recent victory in the High Court against Apple computers.

Computer Edge went into liquidation on March 28, 1985 with debts in excess of \$390,000 and with the only assets being a \$58,000 debt which is currently being paid off at the rate of \$1,000 per month.

Brendan Marchesi, the officer manager with Bent and Cougle, said the meeting of creditors was being called to appoint a committee of inspection and

... will not be at the PC Show - again.Instead, Assco has arranged a show stopping, 17½% off, bargain sell out on Hewlett-Packard calculators.

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to examine what future course of action is open to the creditors.

In Computing Australia last month Michael Suss, the managing director of the company said he was going to sue Apple for damages following his victory. "I will seek enormous damages" and "there will be punitive damages, unspecified damages, damages to my reputation and my company's reputation," he said.

According to Marchesi there is a chance the creditors of the company might be able to now get some money. "It could be assumed that if Suss has a case then Computer Edge could also have a case as it could be argued that the action Apple took against the company may have contributed to it going into liquidation," he said.

However he said that any money recovered would be used to firstly pay the taxation department the \$30,000 it is owed, the staff wages which amount to \$3,500 and Australian Guarantee Corporation, which holds a registered charge over the company's assets as a debenture holder and is owed in excess of \$83,000.

John Le Fevre

Briefs

The desktop publishing market continues to grow.

with new releases becoming frequent. One of the better known offerings is the Personal Publisher for the IBM PC and compatibles. It uses a Mac-like graphics interface and can be controlled by either mouse or cursor keys. Text and graphics can be mixed on the one page; text can be imported from word processing packages; and text can be made to 'flow around' pictures, even if the image overlaps more than one column. Prices start from \$335. Call Software Corporation of Australia in Melbourne for more details . . .

Poor Person Software mentioned elsewhere in Newsprint this month by Guy Kewney now has an Australian distributor: Glyphic Software, PO Box 391 Pennant Hills 2120...

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Nomenclature

What would you have called the sequel to the Data General/One? The 'Data General/Two', perhaps?

Well, that was all too sensible for Data General. Instead, what we have is the 'Data General/One Model 2. The Data General/One Model 2 (DGOM2 for short(?)) comes with either an electroluminscent or an "improved" LCD display. By "improved" Data General doesn't mean "back-lit". which is unfortunate. A back-lit LCD is worlds apart from the traditional LCD which relies on ambient reflected light.

On the plus side though, the DGOM2's other features over its predecessor are an optional internal 10Mb hard disk, a couple of 'user usable' expansion slots, a parallel port, increased internal maximum RAM (to 640k), a video adaptor card and an inbuilt battery and battery charger on the LCD model. Prices start from \$3600 (LCD screen) and \$5600 (electroluminescent screen). END

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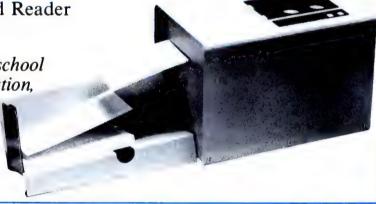
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Teac Disk Drive	\$220	Clip on cooling fan	\$59
384k Multifunction Card (O.K.)	\$276	Joystick for 2e/2c/2+	\$45
Video card TTL/RGB/Composite	\$299	Expanded 80 col 2e	\$70
12 Bit AD-DA Card (16 channel)	\$280	128k RAM	\$199
135 Watt Power Supply	\$200	Eprom Burner	\$65
Metal Case	\$100	16k RAM	\$60

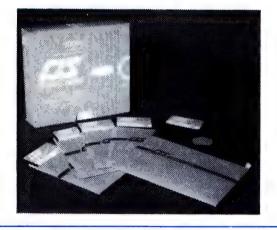
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For the home-loving Commodore owner the questions of operating costs are probably fairly marginal. But for anyone, be it company or individual, who plans to use a computer for business purposes, these costs not only have to be taken into consideration, they have to be

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Now, here I was, faced with the prospect of having to spend real money if this computer was to be anything more than an atmosphere for Flight Simulator. Not only was it costing me money, the prospect loomed of this expense being an ongoing scenario. Since then I have thought about a maintenance contract, and found that the cost is over 21 per cent pa of the purchase price.

What about all those people just getting into computers, especially those small to medium-sized companies who are at last becoming interested, now that networking is looking good? They are contemplating spending perhaps \$25,000-\$30,000 on 'the complete solution to your problems'.

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There could be gold in the hills of supplies.

Details of Write-Hand-Man on (425) 493 3735.

I wasn't surprised to find that neither Atari nor Commodore showed up at the Faire, leaving publicity to local user groups, although I had expected more evidence of the Atari ST range. Staying away was a mistake neither Apple nor IBM made.

New products for the Amiga, however, were in evidence, with the most impressive being a whole catalogue of launches from Micro Forge.

These products are mainly upgrades for the Amiga hardware. Products include a seven-slot expansion system, a second diskette drive. twin MS-DOS disk drives (5in) shown working with the MS-DOS emulator, plus hard disk and memory expansion — all a lot cheaper than rival products.

Micro Forge says all products are available now (May) and will send price lists. Details on (404) 688 9464, in Atlanta, Georgia.

Atari should have shown its Mac-emulating cartridge. It was represented at the Faire by the San Leandro Computer Club, which sponsored a symposium (I didn't attend) with Sam Tramiel, president of Atari, speaking.

The cartridge is 'not a complete emulation system.' but it does allow, says the Club, more than 1000 titles already written for the Apple Macintosh to be transferred to 1 Mbyte STs without modification. And, the Club adds, the programs then run around 20 per cent faster.

Anyone wanting to set up links with the Club can contact the president. Bob Barton, on (415) 352 8118. The cartridge details are with Data Pac Inc, on (213) 821 2623.

Convertible software

Borland International is one of several companies which have already hopped into converting their range of software to the 31/2 inch disk format used by IBM's new convertible laptop PC. Borland programs (including Reflex and SideKick) should be being shipped by the time you read this. Existing owners of Borland software will be able to purchase 3½inch disk versions of their programs for a nominal sum. Owners will not have to return their 51/4 inch disks in order to transfer to the convertible format.

Amiga now **PC** compatible

Commodore is taking the Amiga to its limits by announcing a new hardware device called Sidecar, allowing the Amiga to run PC software.

Sidecar, which is actually a cutdown PC, connects to the Amiga via the interface slot and happily runs Flight Simulator, Lotus 1-2-3 and other PC applications.

With 60 software titles for the Amiga already in Australia, and another 68 expected in a couple of months, Sidecar will open the door to a wealth of PC business software currently available.

Sidecar has a stock standard 256k RAM, 51/4 in floppy drive and has three spare slots available for hard disks, communications cards and so on.

Sidecar is represented as an icon on the Amiga's screen and by clicking the mouse's cursor immediately boots the system into PC mode enabling the user to switch from pretty graphics to 1-2-3 instantaneously.

Manufactured by Commodore in Hong Kong, the first shipment of Sidecar is expected in Australian stores sometime in June and should sell for approximately \$699.

Some details of Atari's PC emulator for its 1040ST are included in the Seventh Australian Personal Computer Show preview elsewhere in this issue, but APC has been unable to get its hands on one by press time. Watch for a comparison of the units in a future issue. Maria Bokic

The coming fad

Producing compatible software may become as big a business as making PCcompatibles, forcing software prices down in the same way that 'me-too' machines have forced the market leader, IBM, to drop its PC prices (or offer rebates, which seems a feeble way to sidestep any claims that competition has forced IBM to lower its prices). In the US, SoftKlone Distributing Corporation is selling Mirror, a \$49.95 knock-off of Crosstalk 16 (retailing for \$195). And Adam Osborne is having some success with his Paperback Software International, a company which includes in its product range VP-Planner a \$99 clone of Lotus 1-2-3.

In Australia, Micro Data Management Systems has picked up the distributorship for a range of dBase clone products, all selling for less than Ashton-Tate's prices and/or claiming vastly improved performance and features.

MDMS has dBase-clone compilers for dBasell and III; and a dBaseIII Plus-clone is expected in June. Call (02) 745 1995 for pricing.

Creditors' delight?

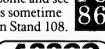
The official liquidator for Computer Edge has called a meeting of creditors of the failed company following its recent victory in the High Court against Apple computers.

Computer Edge went into liquidation on March 28. 1985 with debts in excess of \$390,000 and with the only assets being a \$58,000 debt which is currently being paid off at the rate of \$1,000 per month.

Brendan Marchesi, the officer manager with Bent and Cougle, said the meeting of creditors was being called to appoint a committee of inspection and

.. will not be at the PC Show — again. Instead, Assco has arranged a show stopping, 17½% off, bargain sell out on Hewlett-Packard calculators.

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to examine what future course of action is open to the creditors.

In Computing Australia last month Michael Suss. the managing director of the company said he was going to sue Apple for damages following his victory. "I will seek enormous damages' and "there will be punitive damages, unspecified damages, damages to my reputation and my company's reputation," he said.

According to Marchesi there is a chance the creditors of the company might be able to now get some money. "It could be assumed that if Suss has a case then Computer Edge could also have a case as it could be argued that the action Apple took against the company may have contributed to it going into liquidation," he said.

However he said that any money recovered would be used to firstly pay the taxation department the \$30,000 it is owed, the staff wages which amount to \$3,500 and Australian Guarantee Corporation, which holds a registered charge over the company's assets as a debenture holder and is owed in excess of \$83,000. John Le Fevre

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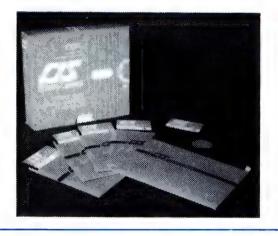
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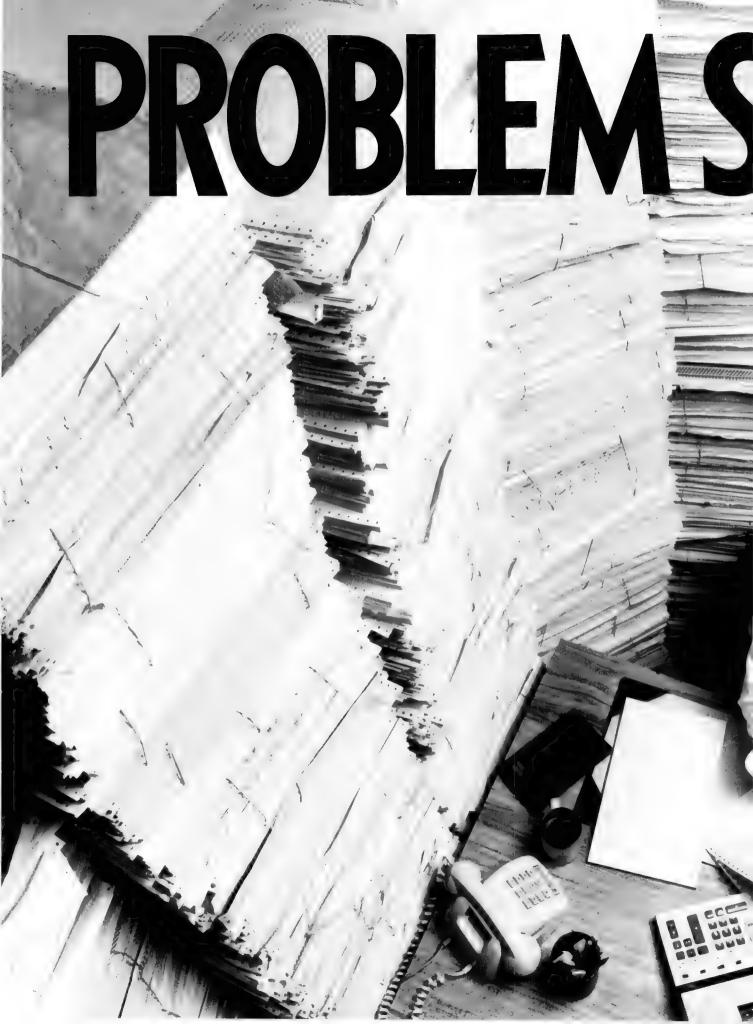
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BENCHTEST PREVIEW

IBM Convertible

The IBM Convertible is certain to cause a stir when it is launched in Australia later this year. Ray Miller takes the petite portable from the giant of the computer industry for a pre-launch spin.

Much has been written in the popular micro press about the IBM lapheld. Code-named the P14 and nicknamed the Clamshell, IBM is about to launch its latest personal computer. Indeed, by the time you read this, the machine will probably have been launched in the US, despite IBM failing to win a valuable (\$US28 million) contract with the American Internal Revenue Service for 15,000 lap-helds. That contract was won by Zenith Corporation, with the Z-171.

Don't hold your breath waiting for IBM Australia to launch the machine, though, as it won't be available over here until much later in the year. Doubtless, a

number of 'grey imports' will appear, but not through official IBM sources.

Convertible by name and by nature, IBM's lap-held PC incorporates many ingenious features, and is bound to raise more than a few eyebrows when it appears. Almost 100 years since the American Census of 1890 which saw the first IBM computer (of a sort), Hermann Hollerith, the founding father of IBM, would certainly raise his eyebrows if he were around today.

Hardware

The sturdy cream-coloured case measures approximately 48.3cms long by

7.6cms deep by 35.5cms wide. Weighing about the same as a small typewriter, the Convertible is a truly portable machine, which is more than can be said of the ill-fated IBM Portable PC. That machine failed because it offered no real advantages over the standard PC, and a number of disadvantages — specifically, you had to be within a few feet of a mains socket, and its expansion potential was limited.

With a rechargeable battery pack capable of powering the machine for 6-10 hours of normal use, the Convertible can be used almost anywhere — on the plane, in the train or in a car (with the optional cigarette lighter socket power



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BENCHTEST PREVIEW

lead). It can also be powered from the mains, and charged overnight with the same adaptor. The comparatively heavy nickel-cadmium batteries can be easily replaced by removing a cover at the back of the machine and sliding out the used battery.

Lifting the lid reveals the screen, the keyboard and the microdisk drives. The process of pulling the screen into position lifts the keyboard to a comfortable typing angle, and brings the front-mounted microdisk drives up from behind the keyboard — a very impressive bit of design!

Opening the box reveals a low-power CMOS processor — the 80C88 running at 4.77MHz (the same speed as the regular PC) and 256k of CMOS RAM, expandable to 640k. Along the rear edge of the machine is a parallel port, a serial port, an expansion bus and a power-supply socket for powering the machine and recharging the battery.

The Convertible features an 80-character by 25-line liquid crystal display (LCD) with dot-addressable graphics, as used in the Toshiba 1100 and many other portables. Fitting 2000 characters onto such a small screen has its drawbacks, as does the use of conventional liquid crystal technology.

Firstly, the characters are small and resemble the elongated, chubby characters which hallmark the Commodore Vic 20 screen; and secondly, the screen requires good lighting, as it does not feature a back-light like the Zenith portable. Depending upon your position relative to the screen, you will have to adjust the contrast; the control to do this is conveniently located at the bottomright of the screen. Compared with other lap-helds, the Convertible's screen is surprisingly small (about half the size of the Date General One's), but is quite clear - once you have the correct angle and contrast.

One of the remarkable features of the Convertible is that when the machine is opened, you can remove the LCD screen and use a separate monitor for increased clarity when working at a desk for extended periods of time. This monitor comes complete with its own stand, and allows the Convertible to be used as a desk-based personal computer (à la Apple IIc).

Having come up to a comfortable typing angle, the Convertible's full-size keyboard is ready to use; and despite the overall small size of the computer, the keyboard is quite pleasant to use. The feel is better than many portable computer keyboards, but not as good as its bigger brother's. Above the main keyboard are the rather small function keys, and to the right of the keyboard are

Compatible PC XT AT

Specifications:

Description	PC/XT	PC/AT
Processor Processor Speed	8088 4.77MHz or 6.77MHz	80286 6Mhz or 8MHz
RAM	640K	640K
Expansion Slots	8 (5 vacant)	8 (6 vacant)
Ports	2 × Serial 1 × Parallel	2 × Serial (1 installed) 1 × Parallel
Real Time Clock	Yes	Yes
Games Port	Yes	No
Co-Processor Opt.	Yes (8087)	Yes (80287)
Monochrome Hercules Comparible Adaptor	Std. 720 × 348 1 × Parallel	Std. 720 × 348 1 × Parallel port
System Pricing with: (Doe Single Floppy Two Floppies Hard Disk Drives	s not include Sales Taxi 360K \$1695.00 720K \$1995.00 10MB \$2995.00 20MB \$3495.00	1.2MB \$4595.00 2.4MB \$5060.00 20MB \$5995.00 40MB \$7645.00
Video Options	Colour/Graphic Mono/Colour	320 × 200 4 colours 640 × 400 4 colours
Power Supply	150 Watt	200 Watt
DOS	3.1 Std.	3.1 Std.
Warranty	6 Months	6 Months
Availability	Ex-stock	Ex-stock

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BENCHTEST PREVIEW



The Convertible's separate printer is a miniature thermal transfer unit

separate cursor control keys which are also smaller than the alphanumeric keys.

Being so compact (it is designed to really fit into a briefcase, unlike many portables), there is no separate numeric keypad, although part of the main keyboard can be reassigned as a numeric keypad. For heavy numeric entry, this design may be sound, but for normal use I found it a little cumbersome.

The Convertible can be expanded internally from 256k to 640k, and there is room on the main circuit board for a modem. Similar to the Tandy 200, this feature will prove to be a necessity for many users such as journalists, salespeople and other professionals who either need to send information back to base, or conversely require up-to-theminute information.

Further expansion is via the expansion port at the back of the machine, and one of the first peripherals to take advantage of this port is the Convertible's amazing printer. The printer is a miniature thermal transfer model, and, being the same height and width as the Convertible, clips neatly on the back of the machine. When it has been clipped into place, the printer extends the length of the machine by four inches, and can easily be carried with the computer wherever it goes.

Print speed is slow, at approximately 15 characters per second, but with a 24-dot print head, the quality is exceedingly good. Moreover, the Convertible's printer is just as happy printing text as it is printing graphics. Printing can be on normal paper using a tiny replaceable cartridge, or on special (that is, expensive) thermal paper.

Although not designed for heavy use, the cartridge should last for a while before needing replacement. Power from the rechargeable battery pack is drained quickly when using the printer and the microdisk drives, so the more you use these devices, the less computing time you will have.

When the Convertible is used with a full-size monitor, the portable printer can be placed to one side of the machine by means of a lead which runs between the expansion port and the printer.

The Convertible will work with any standard parallel printer, allowing you to keep the full-size monitor and a regular dot-matrix printer at the office, for example, while using the portable printer and the LCD screen while you are on the move.

Software

Although the Convertible is PC-compatible, it remains to be seen how much software (especially graphics programs) will run on the machine. More important still is that the disk is of a completely different format from the PC, so existing software will not run as is.

Despite that limitation, files can be transferred from full-size PCs, using an add-on 3.5in microdisk drive. In time, we may see add-on 5.25in disk drives for the Convertible, although perhaps not from IBM.

The review machine came with PC-DOS 3.2, the latest version of DOS, which is designed for use with the new 720k, 3.5in microdisk drives. Also bundled with the machine was an Application Selector program, allowing programs to be selected by simply

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pressing a function button which is assigned to the program you wish to run.

Icons representing disks and tools are shown onscreen, and the Applications Selector is easy to use. Different tools allow you to set the time, date, communication speed and defaults for

power-down power-up and the procedures: the Convertible switches off automatically after use, and the length of time may be set from one minute to two and a quarter hours.

Don't worry about losing data, though, as the machine goes into a state of suspended animation - and when you switch on again, it continues exactly from where it left off. At the time of writing, there is little applications software available, although IBM's own PC programs and best-selling packages such as dBaselll, Lotus 1-2-3 and WordStar 2000 should be available shortly. The PC add-on which will allow files to be transferred from 5.25in format to 3.5in format will allow you to copy files which you have been using at the office onto microdisks for use on the move/at home, or vice versa.

Technical specifications

Processor:

Intel 80C88 operating at 4.77MHz

ROM:

64k

RAM:

256k, expandable to 640k

Mass storage:

Two 3.5in microdisk drives, 720k each

Keyboard:

Standard pitch with numeric keypad overlay

Size:

35.5cms x 7.6cms x 48.3cms

1/0:

Serial, parallel, expansion port

DOS:

PC-DOS version 3.2 Bundled software: Application Selector

In perspective

John Fairfax and Sons has equipped some of its journalists with portable PCs and modems for sending stories back to its electronic compositing system. The American Internal Revenue Service has equipped some 15,000 employees with Zenith Portable Computers. Clearly, there is a demand for lap-held computers such as the IBM Convertible; just how big the market is, remains to be seen.

However, there is certainly no shortage of machines aimed at the user who needs an electronic office while he is on the move. In launching its lap-held PC, IBM is giving the Big Blue Seal of Approval to this area of the market-place. It is also giving a Seal of Approval to the 3.5in microdisk format, introduced by Sony. In changing format, IBM has doubled the capacity of its disk drives from 360k to 720k. Given the advantages of this format over 5.25in disks (small size, protective plastic jacket, and so on), we will doubtless see more machines using this size.

Now, we can expect to see hordes of third-party manufacturers gearing up to produce clones and accessories in no time at all. I wonder who'll be the first to produce a matching clip-on radio modem . . .

Price

Starting at approximately \$US2500, the fairly Convertible is well-priced. although it remains to be seen how much it will cost in Australia when it eventually arrives on our shores. Prices for options are unavailable at the time of this preview.

Conclusion

A lot of thought has gone into the design of this wonderful little machine. From the clever mechanics which lift the keyboard when the screen is raised to the 'plug-in' of the peripherals, Convertible represents the state of the art in affordable, practical, portable PCcompatibles.

A full Benchtest of the Australian version of the Convertible will appear in APC when it is launched in Australia. That launch is expected to be later this year.

END



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Australian Personal Computer Page 35





Hard disk cards

Peter Jackson and Ian Davies examine three hard disk cards for the IBM PC and compatibles — the Hardcard, the FileCard and the Drivecard, which are all examples of an obvious but long-awaited idea: the provision of hard disk capabilities in machines with floppies only.

When Plus Development showed off its Hardcard plug-in disk board for the IBM PC last winter, it suddenly seemed such an obvious idea that the only wonder was how long it had taken for someone to build it. The pieces of the puzzle had been there all along: Winchester disk controller cards could already fit into half-length IBM slots, while half-height and third-height 31/2 in Winchester drives were already being built into various machines. All that was needed was for someone to notice that a 3½in Winchester was smaller in diameter than the standard 4in height of an IBM card, and the rest was merely engineering.

A hard disk controller card could be built using all the latest single-chip techniques, including custom integrated circuits and surface-mounting technology, to squash the controller down to one end of a standard 13in IBM plug-in board. That would leave room to bolt a metal-cased, shock-mounted, half-height Winchester, like those being used in the new breed of portables, to the other end of the board. Plus Development got there

first, and launched its 10Mbyte Hardcard in July last year.

In science there is something called the Eureka effect, where everyone in the field suddenly recognises an idea that has simplicity, elegance, and an indisputable air of correctness. Or, to put it another way, one instinctively knows when something is right. Hard disk makers were certainly shouting 'Eureka!' as they quickly announced instant competition for Plus' Hardcard, with higher capacities than Plus' 10Mbytes, and various add-on functions such as additional RAM, I/O ports, and realtime clocks.

There were around five such boards on view at the Comdex trade show in the US last. November, and there are now something like a dozen on the market from the expected hard disk names and some unexpected new names, too. It seems like a good time, as these drives start to appear in Australia, to examine three typical examples of the species: Plus Development's original Hardcard, Western Digital's FileCard and the Drivecard by Mountain.

CHECKOUT

Where they come from

Plus Development itself is not such a new name as it seemed last summer. Its parent company is California-based Quantum, a well-known designer and manufacturer of big, hard disk drives and controllers for the OEM market — that is, other companies buy bare drives and controllers from Quantum and build them into their own systems. Quantum could see opportunities in the micro market for retail storage products, and set up Plus Development to explore that business without making its big OEM customers nervous.

The work on the Hardcard design took over a year and a half, in conjunction with a manufacturing subsidiary of the giant Japanese corporation Matsushita, which actually puts the boards together.

Western Digital, based in Irvine. California, has a similar but different background. The company has been designing disk controller boards and chips for a decade and more, first for minicomputers, then for early \$100 micros, and then for PC-style singleboard computers. lts single-chip Winchester controllers are used in disk add-ons and add-ins from numerous other manufacturers, and perhaps it was this that prompted the company - like Intel before it — to set up an Enhanced Peripherals Division to market finished products to the retail market. Prime place in the list of three new launches last November went to the FileCard, a 10Mbyte drive on a single IBM card with a compact controller built around Western Digital's own custom controller

The third card comes from the relative newcomer, Mountain, who are based in California, and is called the Drivecard.

Best of the rest

In the US, other boards available include the 20Mbyte DiskCard from top harddisk maker Tandon, and the 10Mbyte Dinasti from the well known JVC. In the UK, Plus 5 Engineering has launched the PlusCard and XTech has started shipping its Insider. And just to prove that the market is beginning to reach some kind of maturity, it got its first lawsuit at the end of February this year. Quantum, parent company of originator Plus Development, is suing Mountain Computer and any other plug-in Winchester maker using drives from NEC in Japan. Quantum alleges that the NEC drives infringe its patents, although both Mountain and NEC are strenuously defending the case.

First a lawsuit, and now the first official

price cuts in the face of competition are under way. The plug-in Winchester business is obviously in a healthy condition.

Hardcard

Plus Development's Hardcard has all the benefits of being first in the market, but it has all the drawbacks, too. The board was designed to be simple to install, simple to use, and usable in every IBM PC on the market, including those where a hard disk was already installed.

By aiming at all PCs, including those benighted machines with the old ROMs, cassette port, 64k motherboards and weedy power supplies, Plus could sell to upwards of three million PC and XT owners. But supporting the old machines means that the power consumption had to be kept down, and that the board had to fit in any long slot at all, keeping the capacity of the board's Winchester drive down to 10Mbytes for the foreseeable future.

'In science there is something called the Eureka effect, where everyone in the field suddenly recognises an idea that has simplicity, elegance, and an air of correctness.'

Opening the smartly-designed packaging, done out in Mothercare-style pastel blue, pink and green, reveals the result. The board, weighing around 1kg (2.11b), has a slim metal enclosure covering the 31/2 in Winchester drive at the non-connector end, while the controller electronics are exposed above the bus connector. A glance at the electronics shows the work that has gone into keeping down power consumption and size: the board is tightly packed with big, surfacemounted, very-large-scale-integration chips in their distinctive square packages, and most of the chip type numbers, including the custom logic circuits, contain the telltale 'C', showing that the chips use low-power-consumption CMOS technology. There are signs, though, that the controller hardware is still being developed; the board layout of the current model is certainly different from the original prototypes, and there is still an extraneous transistor soldered onto the back of the board to put right some small glitch.

Apart from the board, the box contains only a plastic card guide (if required), along with one slender manual.

Installing the board is as simple as installing an IBM PC expansion board ever is. After sliding off the system unit cover and removing one of the metal slot panels at the rear, the board simply slides into the board guides and into the PC's bus connector. The Plus manual flatly states that users should remove any existing board guide at the front of the machine and replace it with the one supplied with the board, but I had no problems with the guide that was already in place. Presumably, Plus wants to make sure that the board is firmly held in the guides to cut down any vibration when the drive is spinning, but the guide in my machine seemed tight enough. On the other hand, the manual's instructions to screw the board firmly into the metal frame at the back of the machine are just good sense.

That is the entire hardware installation procedure, and was no more difficult than my experience of installing a 256k RAM board in the same machine. There is no need to change the DIP switch settings on the PC, and the only possible hardware change the user can make is to alter a 'jumper' on the Hardcard itself. The iumper is set at the factory, assuming that the Hardcard is going to be the first hard disk drive in the system, but if it is going to be the second hard drive - in an XT, for example — the jumper position needs changing. This is a simple task, too, since the jumper positions are straightforwardly labelled 'PC' and 'XT'.

Powering up the re-assembled PC with the usual PC-DOS or MS-DOS system disk in floppy drive A brings up the usual prompt, and the real installation of the Hardcard, the software installation, can begin.

The drive on the board is already formatted at the factory, and also has an Install program ready-stored on it. Typing C:INSTALL C at the A prompt starts the installation program running if the Hardcard is the only hard disk drive in the system, while if the jumper has been changed for an XT system, the Hardcard is drive D and the instruction is D:INSTALL D.

Either way, the Install program takes control of the system and goes step by step through a 10-minute installation procedure. This involves putting the system tracks and all the normal PC-DOS or MS-DOS utilities on the Hardcard. You also need a blank floppy during this procedure, as the Install program creates a 're-install' disk that can be used for setting up the Hardcard from scratch in case of error or glitch. Re-install deletes all the data files, though, so backing up

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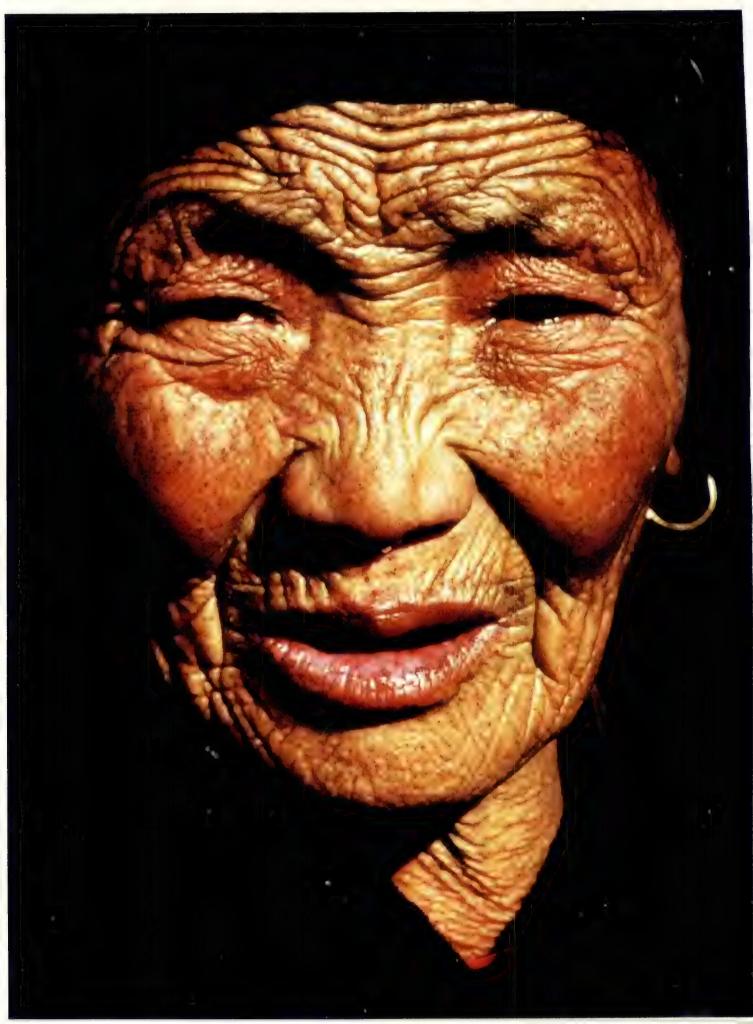
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FLASHPRINT/4 will change the way you use Wordstar.

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these files should be done at the slightest provocation.

While the installation proceeds, you have the chance to notice one feature in the Hardcard's ready-installed software. One problem with plug-in hard cards for PCs is that there is no front panel indicator showing when the drive is active, and this can be helpful; for example, the machine can sometimes appear to have seized up during a long program compilation if it weren't for hard disk activity. Plus provides a program called 'Light' on the board's drive, which flashes a plus sign (+) at the top righthand corner of the screen whenever a read or write operation is under way, at system level or inside an application. Another complementary program called 'Sound' beeps whenever a read or write operation takes place, which sounds appalling through the PC's speaker. Either or both of these features can be turned on or off at any time.

At the end of installation, all you have to do is leave the door of the A floppy drive open and press the Ctrl-Alt-Del key combination for an *ersatz* reset. Just like the XT, the system will boot from the Hardcard if there is no disk in drive A.

At boot-up, the Hardcard runs an autoexec batch file to bring up the Hardcard Directory (HCD) program, also provided on the disk. This lets you set up a menu-driven front-end for all the applications installed on the Hardcard, and has 16 possible menu items. Each numbered item has its own MS-DOS sub-directory, and if you intend to use the HCD structure, you need to copy all the necessary files for each application into its own sub-directory. Then the HCD program lets you create a macro, or a miniature set of batch commands, called by selecting a particular menu item.

For instance, if all the WordStar files are copied into sub-directory SUB1, associated with HCD menu item 1, then the macro you would enter would be CD\SUB1 <return> followed by WS<return>. Then the menu item name could be changed to WordStar, and after booting Hardcard, the program could be run simply by selecting that item.

Quitting any application called up from the HCD menu returns the user to that menu for another selection, and using HCD is about as friendly as using a menu ever is, which is not much. The software does have one disconcerting habit, though: it turns off the screen display after five minutes without use. Seeing the screen go dark from the corner of an eye, while half-waiting for the board to blow — thanks to heat problems — can add 10 years to your age.

I had no problems with the drive

overheating, or overstraining the power supply, despite installing the Hardcard deliberately between the hot-running video board and the 256k RAM board in the Kaypro system. However, like most clones, the Kaypro PC's power supply is rated at XT levels to handle a hard disk rather than at the early PC levels for floppy use.

All that aside, there is nothing to show, when using the system, that the Winchester drive is on a card. The machine with the Hardcard acts just like an XT with twin floppies, as indeed it should if Plus has done its market research and hardware design properly.

The general impression is very favourable. The Hardcard really is simple to install and use, it really does go in any long PC slot — including one in the Compaq or the IBM portable — and it is unobtrusive. With the usual noisy PC fan you can't hear the drive at all, and must rely on the flashing plus sign for confirmation that the thing is running.

Plus has kept its original idea simple, elegant, useful — and tough. An inadvertent shock test involved dropping the board onto a carpeted floor from three feet, with a metal system unit casing instantly falling onto it from the same height. That was before installation, so unless the board was broken before and violent treatment fixed it, the Hardcard survived the test unscathed.

FileCard

Like Plus Development, Western Digital obviously called in a design house to do its packaging: this time, the colours are white, grey and light green. Inside, the contents are similar, too, comprising the FileCard board itself and two slim manuals.

The board is obviously similar in structure to the Hardcard, with the metal drive case at one end and the controller electronics and bus connection at the other. With FileCard, though, there are differences. The drive casing is thicker than Hardcard's, with its own mounting bracket at the end instead of a simple spline to slide into a card guide. The controller electronics are different, too, although they too make full use of VLSI, CMOS, custom circuits and surfacemounting technology. The controller, as you might expect from specialist Western Digital, is beautifully laid out and built, with no blatant kludges or late bolt-ons.

It looks more complex than the controller on the Hardcard, and there is one obvious reason for that in the shape of an extra connector at the bottom of the

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card. This is meant to take a piggyback expansion board, and Western Digital has so far produced one containing up to 512k of add-on memory. Others are meant to be on the way, and would make it possible to combine a hard disk and a multifunction board in one card slot.

Installing the FileCard follows the same general lines as before, but Western Digital imposes some limitations on where the card can go. It can't go in slot one, where the speaker is, since the speaker would get in the way of the drive casing. And although a selling point is that the board takes up just one slot, that is true only in the basic PC (and even then, not in slot one). In the XT, with its greater number of slots slightly closer together, the FileCard takes up a slot and a half. This means that the drive casing overhangs the space that a next-door long card would need, and only a short card such as the new Hercules colour card or a RAM card could be used in that

The FileCard's metal mounting bracket at the drive end of the board is designed specifically for the IBM PC, where the hole in the bracket matches up with a hole in the front panel, and the screw provided clamps the drive casing into the machine casing. On the Kaypro the bracket forces the removal of two card guides to install the board, and then there is no matching screw hole. A lessthan-conspicuous appendix to the manual explains how to install the board using the card guides typically found in PC clones, but since the drive seemed to be working without guides or screwfixing, and was jammed in pretty tight due to the crowded interior of the machine, it seemed easier to leave it.

One disturbing feature of the FileCard installation, apart from the usual dire warnings about CMOS circuits and human static electricity, was the fact that the drive's actuator and motor spindle were exposed through a hole in the back of the board — just where your fingers go when you are trying to wrestle the bulky board into its tight slot. There is a warning about this in the manual, stating that fingers should be kept out of the holes, but without giving any reasons for the holes to be there.

However, once again, that's all there is to the hardware installation, as long as the piggyback memory board is not fitted to the FileCard. Installing that board just involves plugging it onto the socket provided and screwing it down to the main disk controller portion, and it does not make the board any thicker. The expansion board was not available for this review.

The software installation followed the same route as for the Hardcard, but was

not trouble-free. Installing the DOS floppy in drive A and booting as usual. then running the Install program provided on the FileCard by typing C:INSTALL, started the procedure in conventional style. The program copied over the DOS files and utilities needed on the FileCard's disk, and then, in a minimalist style typical of the software. said that it needed a blank disk in drive A. all the information on the disk would be destroyed, and did I want to continue. I typed Y for yes in answer to the last question, expecting a warning to remove the current disk and insert a blank. Instead, the program started to format my DOS disk.

Having produced another DOS backup — for once I wasn't using the master copy — I tried again. This time all went well, until the machine hung up with the message: 'Installing DOS partition on the FileCard'. This was solved by rebooting

'First the lawsuit, and now the first official price cuts in the face of competition are under way. The plug-in Winchester business is in a healthy condition.'

the system with the re-install floppy in drive A; this re-formatted the hard disk and seemed to produce a FileCard working as it should.

Perhaps this was a compatibility problem, but it seems unlikely as all the utilities needed for the installation are generic MS-DOS types rather than pure IBM PC-DOS types. Whatever the reason, the experience did not inspire confidence, although it seemed to end well.

As with the Plus Hardcard, the installation assumes that the FileCard is the first hard disk in the system unless it is told otherwise, and the appropriate jumper changes on the FileCard controller. The jumpers on the FileCard also allow the user to select settings for one FileCard, one internal hard disk and one FileCard, or no internal hard disk and two FileCards, in a system.

Instead of HCD, a program specially produced for Plus Development, Western Digital provides a free copy of the commercial XTree program on the board's disk. XTree, written by Executive Systems of Sherman Oaks in California, is a file-organising front-end for MS-DOS which keeps track of the chaos of files, directories, directories of directories, sub-directories of directories, sub-directories, and so on, ad infinitum,

created by using MS-DOS.

In its series of onscreen windows, XTree shows the structure of directories and their sub-directories graphically, as a ThinkTank-like indented tree structure. The root directory is at the top of the graphic window, with the others sorted alphabetically and extending down as far as necessary. Instead of changing directories with the CD\<name> command in MS-DOS, it is done by moving the cursor to the appropriate directory name in the tree picture. The files in that directory then automatically appear in the Files window below the tree picture, and a program can be executed simply by placing the cursor on the program filename and typing X for execute.

The third window contains a set of statistics relating to the currently-selected directory, disk drive and file.

A wide range of DOS commands are available via the XTree menus and windows, and as with HCD, the idea is that programs can be selected from this front-end program, and quitting the application puts you back in the front-end just where you left it.

Apart from XTree, the FileCard acts just like an XT's hard disk, and although the noise of the drive was rather more obtrusive - the sound of the heads parking themselves in a safe landing zone, if the drive was idle, was a little disturbing at first - the drive acted reliably and easily. Western Digital claims that the power consumption of the board in use, complete with a 512k piggyback board, is an astonishingly low 6W. That is described as 'typical power usage', though, which probably means peaks pushing 10W when the drive motor is active and the heads are moving, and troughs down near zero when the drive is idle and the heads are parked. There was no way to measure the peak power consumption or the operating temperature, but the board did not get too finger-burning hot and there were no surprise glitches in performance.

The FileCard is a beautifully built and finished board that performs well once it installed and formatted. installation is tougher than with the Hardcard, thanks to the different support system and general bulk of the FileCard. but not more difficult than, say, a typical internal modem for the PC. The problems I had with the software installation caused me more worries, but eventually - and with bitten fingernails - I got it working. The installation software is rather too cryptic and leaves too much for the user to do, in my opinion, while not explaining what exactly is going on in words of one syllable.



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TECHNOLOGY



Aimed at simple project management, Logistix boasts an unusually wide range of graphics features combined with helpful data management functions.

Kathy Lang puts you in the picture.

The spreadsheet market has for long been dominated by American products, notably 1-2-3 and SuperCalc, with Multiplan proving popular, too. Now Grafox, a British software house is out to change all that, with a 'spreadsheet plus' called Logistix.

Logistix takes the basic worksheetbased approach followed by its competitors: the worksheet can. theoretically, occupy a maximum of 2048 rows by 1024 columns, though as is usual — the whole worksheet must be in memory. (There is, however, an option to establish links with other saved worksheets - more on this below.) The unusually large number of columns permitted reflects one of the special features of Logistix - its extra commands aimed at simple project management. When used for this purpose, each column becomes a timeslot, each row an element in a project; Logistix has a number of functions for handling such cells, including basic critical path analysis.

In addition to the time-based facilities and the usual range of spreadsheet functions, Logistix has an unusually wide range of graphics features — probably the best on the spreadsheet market — and some simple data management functions similar to those in Symphony.

When Logistix is first loaded, the screen shows a matrix of cells, with letters (A-Z, AA onwards) for columns and digits for rows. If you have a colour monitor, a variety of colours will be used

to distinguish the cursor location, borders, headings, protected cells, and so on, with all colours modifiable by the user as part of the options available on the screen. These and other Logistix commands are invoked in a manner very similar to SuperCalc, by pressing the slash (/) key and then the first letter of the command. Help is available at any stage (through the F1 key on an IBM PC) and is carefully suited to the context in which help is requested. Fig 1 shows a typical Help screen.

Features

Logistix allows you to enter numbers. text or formulae into cells, to move, insert or delete rows or columns, and to copy individual cells, rows, columns or blocks; rows or columns may be copied into blocks of cells, and you can copy a row into a column or vice versa. Cell references are assumed to be relative if typed in lower case; and absolute, if entered in upper case. Recalculation can be in row or column order, or 'natural' order, which is the default: you can have automatic recalculation if you wish, the default is recalculation. Individual cells can be protected from change. Logistix has a very wide range of functions, as Table 1 shows; few of its competitors offer as much, except perhaps in the financial field. Calculation features include a simple conditional processing function.

Logistix has a limited capacity for linking spreadsheets together; you can

establish a link between individual cells in the current worksheet and spreadsheets stored on disk, a link which always uses absolute cell referencing, and which can be permanent or just operate once. Cells linked in this way are automatically protected.

If you want to view two parts of your spreadsheet simultaneously, you can split the screen into two windows, either vertically or horizontally. The cursor can be made to move in synchrony in the two windows. You can also choose to see call values in one window, and the formulae which created those values in the other.

Data can be saved from, or loaded into, Logistix worksheets using a variety of formats, enabling Logistix to read spreadsheets created by SuperCalc or 1-2-3 including their formulae, DIF format files and data files created by dBaseII.

Logistix includes a simple macro feature, allowing you to store sequences of instructions, and activate them automatically. In addition, serious system developers can buy a Programmers' Toolkit, which provides a much more extensive range of controls over Logistix facilities, including such features as the ability to create complete menus of activities.

Graphics

The graphics features of Logistix are extremely good. The types of graph available include a range of pie and bar charts, area and line graphs, as well as

SCREENTEST



Fig 1 A typical Help screen



Fig 3 Pie chart screen view



Fig 5 Database after calculations



Fig 7 . . . task inserted, plan adjusted

special types, such as Gantt and job charts, as part of the time management features. Options include a range of 10 line thicknesses and types, character fonts and sizes, types of hatching and special characters for points on line graphs.

Logistix also allows you to create textonly charts using this wide variety of



Fig 2 Pie chart, commands and data



Fig 4 Database used in timesheet



Fig 6 Timesheet . . .



Fig 8 Critical path analysis

features, making it possible to produce all the transparencies for a presentation through the one software package.

Graphs can be displayed on the screen, at present only through the standard IBM colour display, thus giving just four colours at the lowest resolution. But Logistix supports quite a wide variety of matrix printers and plotters,

and up to 16 colours are available if your plotter permits. Fig 2 shows a simple set of figures which are graphed on the screen in Fig 3.

Data management

Logistix includes some simple commands which allow you to carry out simple data management functions within the worksheet. Up to 64 fields (columns) and 2047 records (rows) can be treated as a table; cells within the 'database' can be treated in exactly the same way as ordinary cells - indeed, they are ordinary cells, and do not need to be pre-specified as a 'database' except in the Query facility. Sorting can be carried out simply through a command. Queries can be set in a separate part of the worksheet to carry out quite sophisticated searches, including the use of wild codes, and the ability to combine several criteria in such a way that all, or only some, of them must be met. Once executed, you can use the results to find the selected records, or to copy them to another part of their worksheet. These facilities cannot be said to be comparable with those of even the simplest data management system of the 'automated card index' type, but they would be quite adequate for simple numerical tables needing basic sorting and query features.

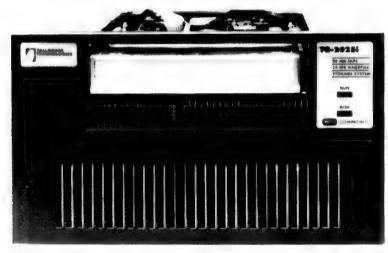
Time management

The time dimension is the most unusual aspect of Logistix, and allows you to carry out simple project management and monitoring tasks. You begin by specifying the time units to be used usually in terms of the half-hour, hour, day, week, month, quarter, half-year or year, although you can adapt the system to cope with other units. Then each task in the project is specified in terms of those units, giving a length of time for the task, showing the resource required (this dictates which row the task appears on), and specifying either the start point in absolute terms, or dictating this in terms of other projects using the 'After' function. There is no 'deadline' feature, so you cannot say that a project must be completed by a certain time.

Once the project details have been established, you can issue the Kritical [sic] command, to get a critical path analysis of your project. This will show the tasks whose completion on time is critical to achieving the currently projected completion date. The same command also allows you to see which tasks have some spare time — 'float' in project management terms — how much float there is, and when it occurs. Figs 4-

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8 show the sequence of creating a timesheet and the subsequent critical path analysis.

The Logistix time features are useful without being especially powerful by contrast with the specialist project management packages; for example, you can't specify a deadline by which all



tasks must be completed, nor can you say that two tasks cannot take place simultaneously, but the order of carrying them out is irrelevant. However, you do get a range of functions sufficiently powerful for simple situations included in the basic worksheet approach. Not only does this save money - project

Mathematical functions

Cosine (value in degrees) COStualue SIN(value) Sine (value in degrees) Tangent (value in degrees) TAN(value) COSH(value) Hyperbolic cosine SINH(value) Hyperbolic sine

TANH(value) Hyperbolic tangent ACOS(value) Inverse cosine Inverse sine ASIN(value) ATAN(value) inverse tangent

DEG(value) Degrees (value in radians) RAD(value) Radians (value in degrees)

3 1415926536 PF ABS(value) Absolute of value INT(value) Integer of value

ROUND (value, n)

Rounds value to n digits

2 718281828459

EXP(value) e (2.718281828459) to power of value Natural logarithm (base e) of calue LN(value) LOG(value) Common logarithm (base 10) of value SQRT(value) Square root of value

RAND Random number between 0 and 1

Logical functions

TRUE FALSE Returns 0

AND(values) 1 if all values are non-zero otherwise 0 OR(values) I if at least one value is non-zero, otherwise 0

NOT(value) 1 if value is 0, otherwise 0

IF(cond-value, true-value, false-value)

true-value if cond-value is non-zero, false-value if

cond-value is zero

ERR Returns ERR (error)

ISERR(value) I if value is ERR, otherwise 0 Returns N/A (not available) NA

ISNA(value) 1 if value is N/A (not available), otherwise 0

Time functions

(up to 10 jobnames, or ANY, for each function)

START(jobnames,row/range) Column of first occurrence of job(s), on row or within range

END(jobnames,row/range) Column of last occurrence of job(s), on row or within range

LENGTH(pobnames.row/range) Number of cells occupied by pob(s), on row or within range

AFTER(jobnames,row/range) Column following latest end of

link function)

job(s), on row or within range (also the Critical Path Analysis

FLOAT (jobnames.row/range) Number of cells of float for job(s).

on row or within range (applicable only to Critical Path

Analysis) Name of job in cell JNAME(cell)

Calendar functions

(column must give a numeric value)

TOD(column) Time (hours and minutes) of column DAY(column) Day of the month (numeric) of column Month (alphabetic) of column MONTH(column) YEAR(column) Year of column

Day and month of column DOM(column) Day, month and year of column DOMOY(column) Month and year of column MOY(column)

Day of the week (alphabetic) of column DOW(column)

MON(column) Month of column Week number of column NWEEK(column) Day number of column NDAY(column) Column containing date DATEIdate)

TIME(date.time) Column containing date and time

Statistical functions

SUM(values) Sum of numeric values COUNT(values) Number of numeric values AVG(values) Average of numeric values MAX(values) Maximum of numeric values MIN(values) Minimum of numeric values

Database functions

(field may be a field offset or a field name)

DSUM (input, criterion, field) Sum of numeric values in fields of selected records

Number of numeric values in fields DCOUNT(input,criterion,field) of selected records

DAVG(input, criterion, field) Average of numeric values in fields

of selected records

Maximum of numeric values in fields of selected records Minimum of numeric values in

fields of selected records

Financial functions

DMAX(input, criterion, field)

DMIN(input,criterion,field)

(RR(guess, values) internal rate of return Net present value NPV(rate, palues) Future value FV(payment,rate,term) PV(payment,rate,term) Present value PMT(principal,rate,term) Mortgage payment

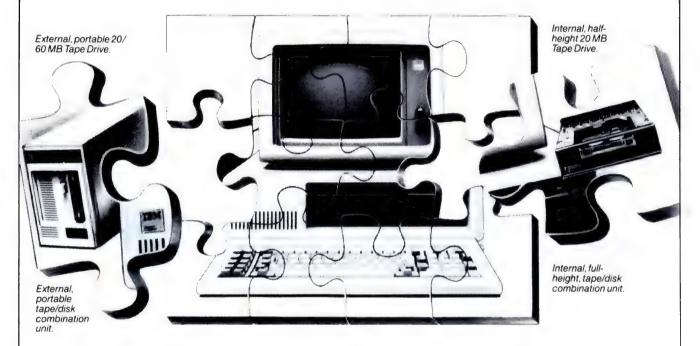
Special functions

COL Number of column Number of column (alphabetic) NCOL(column) Number of row ROW CHOOSE(n,values) Returns ath value Returns value adjacent to value in LOOKUP(value,range)

Julian day, month and year JDAY(value) JDATE(dat Julian number of date Operating system date TODAY Operating system time TELTIM

Table 1 Logistix functions

TALLGRASS THE THE PERFECT FIT



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SCREENTEST

management packages are very expensive — you also have the opportunity to experiment with such techniques, using a simple approach which should come quite easily to people who already have some experience of using spreadsheets.

In use

The basic worksheet functions of Logistix are provided mainly through the slash commands, with the addition of a few function keys. If you have more than six function keys, you can use the rest to invoke your own macros. Most of the commands use the mnemonics you would expect: S for Save; I for Insert; and so on. I found the use of colour exceptionally helpful.

Options, such as screen colours and printer and plotter features, are also easy to set up, with one small exception; in order to set the plotter port speed or the number of data bits, for example, you must first issue a 'mode' command or its equivalent — you cannot do that part of the setting up through Logistix.

Resources

Logistix is available on quite a range of systems, including the IBM PC and most

compatibles, the Apricot, the ICL PC, and several others. On an IBM PC, it needs 384k memory and, to get the best out of it, a graphics board and monitor. The package costs \$795.

Logistix supports the 8087 maths coprocessor, but not as yet any of the additional memory boards such as Intel's Above Board.

Conclusion

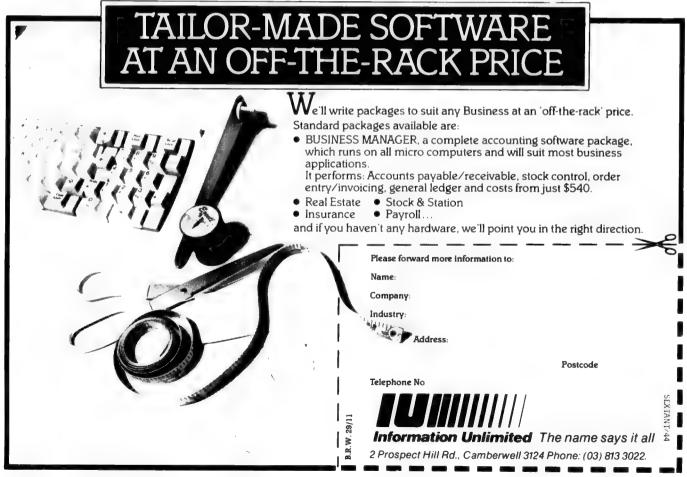
The range of functions provided by

Logistix is unusually wide for what is basically a colour spreadsheet. At \$795, it provides excellent value for money.

Logistix is available from South Pacific Computers, 417 Ferntree Gully Road, Mount Waverley, Vic 3149. (03) 543 4477.

END





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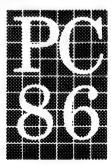
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YANKEE DOODLES



American users, discouraged by today's prices, are turning to a fast-growing alternative — bargain hunting. David Ahl sifts through the top US news stories.

cost when its maker was still in business.

Bargain hunting

An emerging trend, particularly among medium and small-size companies, is the purchasing of used, discontinued, and off-brand computers at bargain prices.

Consider these recent offerings: a used \$900 Apple IIc for \$400; an IBM PC clone with 640k and an 8MHz CPU for \$795; and a discontinued Tandy Model II for \$500, compared to its original price of over \$4000.

Bargain hunters can find used computers in many ways. Specialised flea markets and shows are one of the most popular; thousands of machines change hands at the huge Trenton Computer Festival in April every year. The Computer Shopper, a monthly tabloid, lists many hundreds of used and discontinued computers each issue. The Boston Computer Exchange is a computer broker with a file of over 1000 used computers and related hardware; it charges a seller 10 per cent of the sales price and sells its list to prospective buyers for \$10. Several electronic bulletin boards and information services carry listings of used equipment, and local newspapers run many listings on their classified pages every

Most retailers shy away from used computers. They don't like the hassle of negotiating with buyers over the price, reconditioning the machines, and having buyers expect a warranty. But some retailers handle new computers obtained at close-out sales from defunct manufacturers. Recently, the Columbia PC (an IBM clone) has been showing up in retail shops for approximately \$1200 — about half of its

Community memory

The Community Memory system was first proposed by Lee Felsenstein, designer of the Sol-20 computer, back in 1978. However, as the dream of several people but the fulltime project of no-one, it took six long years to finally come into existence in Berkeley, California. Now, with a year of operation under its belt, the word is spreading, and other communities are expressing interest in setting up similar systems.

Community Memory is basically an easy-to-use electronic bulletin board with, at the moment, three terminals in high-traffic sites: a supermarket; a popular restaurant and community meeting place; and the Whole Earth Access Store (a 'hip' department store with a wideranging clientele).

When the system was set up, the organisers did not know whether they would have to provide 'helpers' at each site: whether the terminals would stand up to heavy use and abuse; and whether the system would become overloaded or, worse, not be used at all. But most of the problems anticipated by the organisers never materialised. People were able to use the system without supervision, and there has been no vandalism whatsoever. Every month, each terminal attracts about 600 users, and over 1000 new messages have been added to the database.

Messages on the system are incredibly diverse. Initially it contained mainly 'visible CB radio chatter', but this quickly changed to longer and more substantive messages. At any point in time, the system is now filled with about 3000 messages, ranging from ads

to jokes to poetry to lonely heart pleas to nonsense. As might be expected from a system in which messages are not edited or censored, there is something to interest or offend almost everyone.

Back issues of the project newsletter and information about starting such a system are available for \$US2 from The Community Memory Project, 2617 San Pablo Ave, Berkeley, CA 94702. Tell 'em David Ahl sent you!

Brainwaves

Researchers have been saving for years that the conventional Von Neumann computer architecture is eventually doomed. Speeds can perhaps be increased by another one or two orders of magnitude, but real improvements, say researchers, lie in a completely different architecture parallel processing. Several experimental parallel machines have been built on university campuses, most notably Carnegie-Mellon, but now a host of smaller manufacturers have also started making such machines.

A conventional computer processes information sequentially, extracting one piece from memory and then returning it before going to work on the next piece. Parallel computers link together many microprocessors and have them all work at the same time. The machines which have been delivered so far use between eight and 48 processors. However, one under development by Thinking Machines, the Connection Machine. utilises 65,536 processors, and is attempting to become the fastest computer in the world.

But while parallel processing can make imaging and scientific calculations blindingly fast, the machines are extremely difficult to program. Moreover, there is no standard architecture, so customers are faced with dozens of different designs. As a result, some sceptics say that they will never be widely used. They are not particularly suitable for business applications such as managing payrolls or financial transactions (which, of course, must be done sequentially), and some computer scientists even doubt their value in scientific work.

Random bits

Those across-the-board IBM price cuts mentioned here last month are not reaching endusers; instead, most dealers are taking them as added profits . . . Steve Jobs has purchased the controlling interest in Pixar Inc, formerly a division of Lucasfilms, the company responsible for the Star Wars films. Jobs would not say whether Pixar's imaging technology would be incorporated into the high-end academic workstations which are being designed by his new company, Next Inc . . . Space Coast Systems is delivering a nifty 10 or 20Mbyte hard disk unit for the Apple II which fits neatly inside the machine; cost is \$US1195... The National Science Foundation will finance a fifth supercomputer research facility in the US at Carnegie-Mellon University . . . The prices of plug-in Winchester hard disks on a card for the IBM PC are likely to drop dramatically in the next year to the \$US500 range. Such drives will largely replace the separate units on the market today...Texas Instruments will introduce a line of highspeed (40 pages/minute) laser printers later this year; prices will start at \$US3000 ... The new Apple II will use the Western Digital 65SC816 MPU, which is compatible with the 6502 in the Apple II and can emulate the 68000 of the Macintosh.

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CHECHOUT

Drivecard

The Drivecard, from the Californian based Mountain Computer, is the cheapest of all three. It seems to achieve its low price by the omission of bundled directory utilities, rather than by compromising quality. Despite the price, the Drivecard still manages to provide a capacity of 20Mb, formatted.

The card itself is one of the heaviest and the widest. The disk is enclosed in a moulded plastic cover on one end of the board, with the electronics largely on the other end. A bracket runs down the back of the component end of the board, as otherwise picking it up by the wrong end would surely snap the PCB. The circuitry is almost exlusively VLSI and customised chips. The layout is extremely well finished, with no tell-tale yellow wires.

While it is possible to see the stepper motor actuator and wheel, fingers can do little damage and it does make rather interesting viewing. Boot ROMs on the board means that your system can boot directly from the Drivecard.

Installation is the proverbial breeze, and involves lifting the lid, plugging in the card and closing it up. A spare mounting guide is provided just in case you happen to have lost one, and the disk comes preformatted for DOS 3.x. Thus for the latest DOS users, no software installation is required — simply turn the system back on and start filling up your new hard disk. DOS 2.x users need to reformat before use, as the DOS 3.x disk layout uses a totally different FAT (File Allocation Table) structure, utilising 16 bits per FAT entry rather than the usual 12 bits. This means that the FAT is larger, but the cluster size is smaller, thereby wasting less space on the end of every file.

A utility disk is provided, but does not include a directory manager or menu program. Instead, it contains an equivalent of the normal FDISK program, which allows you to define multiple partitions on the one hard disk. This can be useful for running multiple operating systems from the one device. Additionally, a SHIPDISK program is provided to park the disk heads.

The Drivecard can be installed either as hard disk number one or two, just by changing some jumper settings. Additionally, it is possible to use the controller on the Drivecard to run a second hard disk — which must be one of the approved varieties, but can be a standard XT drive. This is pretty neat, as it means you don't have to clutter up your expansion slots with multiple controllers.

The Drivecard plugs into a single slot, but because of its width, actually renders the slot next to it only useful for half sized cards. In IBM PC and XT machines, this can be countered by relocating the speaker and installing in slot one. In the M24 used to test the card, it seemed to encroach on the slot either side. Additionally, because the M24 16-bit slots have the 16-bit extensions on the opposite end to the 8-bit connectors, the

'... it suddenly seemed such an obvious idea that the only wonder was how long it had taken someone to build it.'

board could only be mounted in one of the 8-bit slots. This was, of course, peculiar to the M24.

The Drivecard is certified to run on the IBM PC, XT, Compaq Deskpro, Portable and 286, and the AT&T 6300 (Olivetti M24); most PC-compatibles shouldn't present problems. The manual provides a section on how to remove the cover on each of these machines. It may seem like a strange thing to put in a manual, but taking the cover off really is the most difficult part of the installation.

Conclusion :

The obvious market for all these hard disk boards is the large community of IBM PC owners, and owners of compatibles, who have previously been running their machines on floppies only. Most of these machines have no space to install an internal hard disk, and

upgrading before these boards came along would have involved a bulky external Winchester box.

Now, as long as there is enough slot space, a hard disk can be plugged neatly into the internal bus, with no external sign that the machine has had its computing power boosted.

Choosing the right board from the many on offer depends on what type of capacity you want at what price. Of the three boards tested here, the Mountain Drivecard would be fine if you have lots of free slot space and don't need help managing your directories. It is also the one offering a 20Mb capacity. If you need RAM expansion as well, the FileCard would be the way to go. And if you want the smallest, neatest and narrowest package, then the Hardcard would be hard to beat.

One area where the Hardcard scores is in future upgrading. If you want to add another 10Mbytes, another Hardcard can be plugged in as long as you have any spare slot. Likewise, two FileCards can be plugged in, but here the space issue is a bigger problem, particularly with an XT or a crowded compatible. I tried the Hardcard plugged in alongside the FileCard, and that worked as long as the jumper on one of them was changed to show that it was the second hard disk in the system — I changed the Hardcard jumper since it was easier to understand which way it went - and the second drive was installed or re-installed as drive D.

The Drivecard not only can co-habitate with itself and other disk systems, but can also be a controller to a second hard drive.

Some doubt must remain as to whether an IBM PC of really old vintage, with the 65W power supply and the 64k maximum motherboard, could cope with the extra 10W peak load when one of these boards is plugged in. And even if it could, it would need a new BIOS ROM set to handle the hard disk.

But the hard disk board manufacturers assure me that it is reasonable to use their products on such long-toothed machines. And naturally, all compatibles worth mentioning have a beefed-up supply that can cope easily.

The general impression of the three boards on test is that they are simple to install, simple to use, and improve the performance of a typically-sluggish IBM PC clone to a marked degree.

Hardcard: \$1795; Tech Pacific, Tel: (03) 690 9055.

Drivecard: \$1645; Logo Computer Centre, Tel: (02) 819 7307.
FileCard: \$1922; Daneva, Tel: (03) 598 5622.

Technical specifications

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SCREENTEST

Which CAD?

There currently exists a number of micro-based computer-aided design (CAD) packages on the market which vary widely in their abilities and prices. Phil Cohen looks at Autocad and Prodesign II, two packages with different backgrounds and very different prices.

Until quite recently, the difference between buying a CAD package and buying any other piece of software was that you couldn't just buy the package — you had to buy a plotter or some other peripheral for it to drive.

This pushed the price of CAD up by several thousand dollars, and meant that before you even thought about a CAD package you first had to think very carefully about things like the maximum drawing size you were likely to need, how many colours of ink you would have to use, how fast you wanted the drawings produced, and so on. So buying a CAD package became a question of buying a CAD installation.

Now, however, partly due to the influence of machines like the Apple Macintosh, which allowed the user to draw diagrams and mix them with text,

"Prodesign II comes from the other end of the market, and does not have anywhere near the number of features that Autocad does."

then print them on a dot-matrix printer, there is a growing trend to use CAD packages for diagrams, overhead slides, and a host of other things that the old CAD machines were not designed for.

There is now a slow convergence of technology, with the low-end Macintosh-like products taking on more and more functions to (hopefully), compete with the high-end expensive professional CAD products.

Autocad has been around for a long time (the two-dimensional version has been reviewed in June 1984 APC), and is something of an industry standard for micro-based CAD of the old type. It's designed to be a replacement for a mainframe CAD system, and will do almost everything that could be expected of a mainframe system, including drawing in three dimensions. It costs several thousand dollars.

Prodesign II comes from the other end of the market, and does not have anywhere near the number of features

that Autocad does. However, it has enough features to allow it to be used for complex two-dimension drawings, and is designed to be used with a dot-matrix printer (with which it gives very good results — see Fig 1). It costs several hundred dollars.

Both packages run on the IBM PC and compatibles. This review used a compatible with a hard disk and a Hercules graphics card to compare the two packages, and is an attempt to show the differences between the two to allow a potential buyer to choose which type of

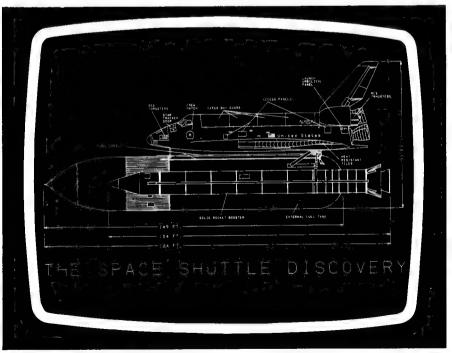


Fig 1: Screendump from Prodesign II using a dot matrix printer.



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package would best suit a particular application.

It would be foolish to spend several thousand dollars on Autocad if Prodesign II was all you needed. It would be similarly foolish to buy Prodesign II and try to use it for a task that only Autocad could handle.

Autocad

The version of Autocad reviewed was Autocad II with the ADE 3 addition, which costs \$4300. It is possible to run Autocad on a floppy disk system, but with that sort of outlay (plus the price of a plotter), it would be foolish not spend the extra couple of thousand dollars on a hard disk.

The Autocad package holds a few surprises. The first is the manual, which looks like an expensive coffee-table book. The binding is what printers call 'perfect-bound', which means that it looks more like a hardback book than a manual. I suppose when you charge that sort of price for a package, you can afford up-market packaging.

Also, the product has been around for so long that it probably doesn't need the sort of documentation flexibility that a ring-bound manual would give.

The other surprise is that the whole Autocad suite of software comes on only five floppy disks. Other less weighty packages can include anything up to a dozen different floppies.

The software itself takes up only two disks, and the rest are for examples, drivers, etc. Autocad is written in the Lisp fifth-generation language, which comes as a bonus with the software.

Installation on a hard disk is simply a matter of copying all of the files across and answering a few questions about the types of peripherals to be used. After that, it is possible to run Autocad.

The first menu allows you to call up an existing drawing and edit it, or list the drawings on the disk, or start a new drawing.

Calling up an old drawing causes the screen to clear, and be split into three areas — the command area at the bottom of the screen, the menu area at the right of the screen, and the drawing area which takes up the rest of the screen.

By using the cursor control keys (the review machine was not fitted with a mouse or digitiser), it was possible to move a pair of cursor crosshairs around the drawing surface. The cursor movement is smooth and fast — a very important consideration in a CAD package, since the speed with which the operator can use the package can make a lot of difference to the installation's profitability.

SCREENTEST

Commands are entered in text form in the command area at the bottom of the screen. Prompts are displayed when appropriate, and help text is available for any command.

The command interpreter has the annoying habit of putting a prompt up for a particular keyword when you press the

"Autocad is written in the Lisp fifth-generation language, which comes as a bonus with the software."

space bar at the end of the word. This means that you never actually get to type a line of commands.

There are approximately one hundred commands, and most of them need a specific sequence of inputs after the initial command word, so that learning Autocad is not a simple matter. I suspect that it would take a non-computer-literate draughtsman several weeks to get up to speed.

To make things a little easier, there is a menu area to the right of the screen where the user can select items with the cursor. Each item can be 'reprogrammed' by the user to a particular command string, and tree-structured menus can be built up. This means that after becoming proficient, the user can build up his or her own set of favourite commands, or even a different set for each drawing type (plumbing, office layout, electronics, etc).

Output from the package can be configured to suit any number of different plotters, or even dot matrix printers. The Epson FX80 is a common standard for cheaper dot matrix printers, and Autocad will drive it quite happily.

This may be useful for producing drafts of drawings in one colour, when a plotter is being shared by a number of different PCs, but I can't imagine anyone putting the cash and effort into becoming familiar with Autocad and then using it to drive a dot matrix printer.

Once you have a grasp of some of the keywords, using Autocad is quite easy and very fast. The package responds very quickly (especially to cursor movements), and everything is very smooth.

Apart from the usual tricks that CAD packages get up to, like multiple layers in the drawing which can be turned on and off or plotted in different colours, Autocad has a plethora of little tricks and depths to it that would take weeks to even explore.

To take one very small example, when asking for a particular area of the drawing

to be 'hatched' (filled in with a line pattern), the number of different hatch patterns the user is presented with is enormous—and you can define you own as well.

Three-dimensional objects are defined very simply, by telling the package what height you want the object drawn at, and what thickness you want it to be. Changing the 'viewpoint' of the drawing allows you to see what you have drawn from a number of different angles, although the package will not support perspective views.

All objects drawn with CAD packages are defined as a series of lines in space, and normally all of these lines are visible all the time. This means that if you draw a desk and look at it from above, you will be able to see its feet. However, Autocad had a good 'hidden line removal' algorithm, which will make all of the lines which you would not be able to see in real life invisible when you ask it to.

Unfortunately, hidden line removal takes time, so it is unlikely to be used more than once, when the drawing is near completion. To speed things up, you could add an 8087 maths coprocessor to the PC.

Autocad is designed to be a 'production' CAD system, used every day by experts. It has a massive number of features, and learning Autocad is like learning a new computer language — not to be undertaken lightly.

Prodesign II

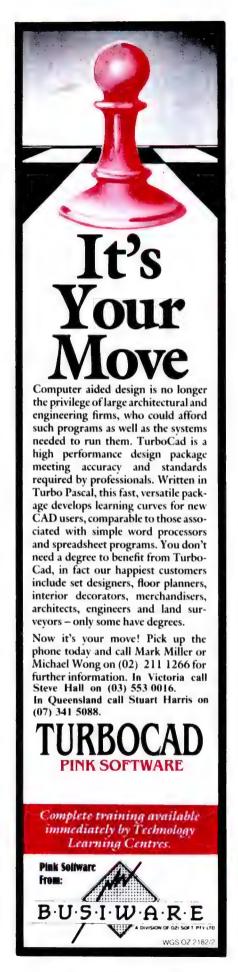
Prodesign II costs \$485. No-one, not even the Australian distributor of Prodesign II (PD2), would claim that it was a successor to Autocad. It is aimed at a different part of the market, and although I may make comparisons between the products, that's just to show the differences that you should expect between packages from these two different ends of the market.

PD2 comes in a plastic library case which has a built-in ring binder to hold the documentation, and a little plastic-covered trapdoor in the back for the three disks.

One of the disks holds all of the software for the package, in a version for use without the 8087 maths coprocessor, while another holds the same software for use with the 8087. A third disk holds sample drawings.

The quality of the documentation is not very good. Not all of the information that you might need is included, and it's certainly not laid out in a useful way. Don't expect to start producing your first drawing in ten minutes.

Starting up the package is simple: once again mainly a matter of telling it



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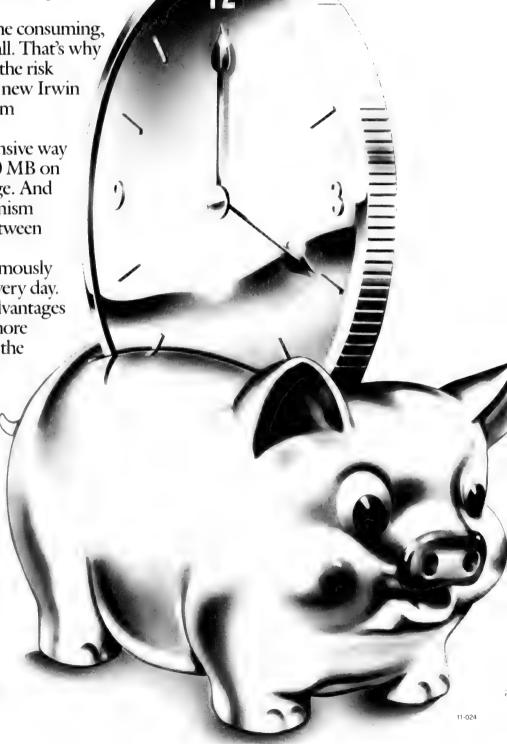
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what peripherals you want to use. PD2 will handle plotters, but its main claim to fame (and the way in which it is likely to be used a lot of the time), is in driving dot matrix printers, like the Epson FX80, or one of a large number of others.

Having got the package up and running, the next step is a difficult one. There is a status line across the top of the screen, a quick-reference guide and a manual that both present the commands in alphabetical order. Not a good way to start.

With much difficulty, I managed to get an existing drawing loaded and onto the screen. Actual screen refresh (redrawing on the screen), is not much slower than

"In general, there is not much you can't do with PD2 that you can do with Autocad — it just takes longer to do it."

Autocad, which shows that the innards of the package are well written. However, cursor movement is very slow, and it is quite possible to fill up the keyboard buffer with cursor movement commands and overshoot.

This alone slows down the drawing process markedly. Perhaps if I had been using a mouse or digitiser, things might have been different.

I was pleasantly surprised, however, with the richness of commands provided by PD2 (when I finally figured out what they were and what they did). For example, things I expected to find only

on Autocad, like fillets (nothing to do with fish — this means automatically making a semi-circle where two lines meet to show a rounded corner in a moulding) and chamfers (same as a fillet, but straight instead of round).

Text is well supported, with a choice of three typefaces. It is possible to draw text starting at one point, or to fit between two points, or using three points to give a slant (italics), or even using four points to give text that starts small and ends up large (for text that appears on a surface that slants away from you in a perspective drawing).

Where Autocad has an automatic step and repeat function (for drawing things like ladders, where an item is repeated every so often along a particular path), PD2 has a simpler approach, which involves copying part of the drawing as many times as you like in a number of different positions.

The zoom feature of PD2 is typical of the clumsiness found in all of the package's commands. To zoom in on a particular part of the drawing, you select the centre of the point you want to zoom in on, then type in a number which tells the machine the factor by which you want to zoom. What it does not allow you to do is define an area of the current drawing to zoom in on (as, I have to mention, Autocad does).

There are other possibilities with the zoom command, some of which can involve a combined rotation and zoom, but are slightly difficult to use and not very intuitive at all.

But all in all, PD2 is a powerful package for the price. It has a surprising wealth of features, including for example automatic drawing of dimensions, which I dign't expect to find. In general, there is not much you can't do with PD2 that you can do with Autocad — it just takes longer to do it. In terms of productivity for a professional draughtsman, the time saved by using Autocad would pay the extra \$4000 in a matter of a few weeks, but with many applications a little loss of speed is not going to make all that much difference.

Summary

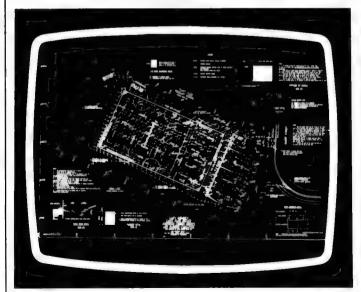
So put some thought into just what you are going to use a CAD package for before you buy one. Neither of these packages is particularly suited to producing overhead slides, by the way, mainly because they don't come with enough typefaces. There are other packages suited to that type of work.

As a rule of thumb, I would suggest that Autocad would be suitable to situations where one or more people spent much of their time doing nothing but producing drawings, while PD2 would be more suited to small engineering practices and other places where the occasional drawing is needed.

The review copy of Autocad was supplied by Logo Computer Centre, Suite 303, Henry Lawson Business Centre, Birken Head, Harbourside, Drummoyne, NSW 2047. Telephone (02) 819 7307.

Prodesign II is available from Software City, PO Box 62, Blacktown NSW 2148. Telephone (02) 621 4242.

END



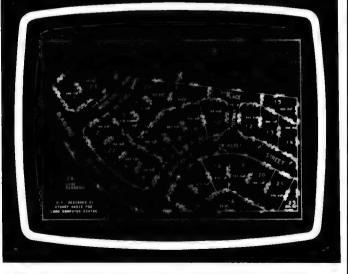


Fig 2: screendump from Autocad



Olivetti M19

The M19 forms part of the Olivetti range of IBM-compatible micros. But, although the machine is guaranteed first-class support, it does have some worrying omissions. Nick Walker looks it over.

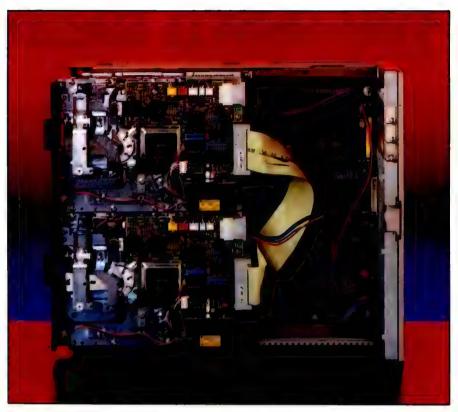


In 1984 Olivetti launched a new business microcomputer, the M24, its first IBM-compatible. While it may be a shame that Olivetti had to conform to the standard of one of its major rivals in order to make an impact on the market, the company certainly showed IBM how it should have been done. The M24 was one of the fastest, most compatible, best-designed compatibles available, and to this day it still remains one of my favourite choices as the best all-round PC-compatible.

Justifiably the M24 sold well and is now making inroads into the US after a couple of false starts. Following in the M24's tracks, Olivetti has launched not one but three machines, all IBM-compatible, to be added to the M24 to make a range of machines covering the whole spectrum of IBM-compatibles. These three new machines are the M19 entry level PC-compatible, the M22 laptop/portable model and the M28 PC/AT-compatible. As the M19 is the first of the three to make its way to our shores, I decided to take a look at it.

Hardware

At first sight the M19 doesn't look like an IBM clone at all. Although it conforms to



The main PCB is well built and occupies the entire base of the unit



The classy looking keyboard is similar to the PC/XT's

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BENCHTEST

the classic three-box design, the M19 seems far too small and well designed to be in any way related to the monstrous heaps that IBM produces. The main unit is less than the height of an IBM floppy disk drive or, for that matter, the height of an IBM expansion card; the width is half that of the IBM PC and even its depth is less than the IBM's. To be exact, the main unit measures just 32.2cms wide by 38.2cms deep by 8.2cms high, which must surely make it the smallest, desktop PC-compatible available. Needless to say, it looks very unobtrusive.

Like other Olivetti micros the M19 is finished in an office grey plastic and, as you might expect from an Italian company, it looks as though some thought has gone into the overall design. The overall effect is very pleasing, though to my mind the grey plastic is a bit too sombre to do the machine justice.

There is not much room on the front panel for any more than the two 5½ in disk drives which are mounted side by side. The inch of plastic that runs underneath the drives is vented and contains a badge on the left-hand side and a socket for connection of the keyboard to the right. There is no on/off switch on the front panel nor, for that matter, anywhere else on the main unit. The power for the whole system comes from the monitor and the single on/off switch is on the front of the monitor.

The sides of the machine are equally sparse, though if you look closely you'll find a reset on the right-hand side. This pleased me immensely, as more and more of the software I use seems to crash in such a manner that the usual software reset of Ctrl/Alt/Del keys pressed together fails to work. (The original IBM PC didn't have a reset switch and most compatibles have sheepishly followed suit). Next to the reset switch is a round hole in the casing into which you can screw a second piece of plastic to form a volume control. This,

like the reset switch, is a useful little extra which is missing on the PC.

The rear panel houses the usual collection of IBM-compatible sockets, Tothe left there are three sockets in a row: an RGB socket for the monitor; a serial port; and a Centronics parallel printer port. Above this a multi-way power plug provides the power to the main unit - on the review machine this proved a little awkward to connect and looked as though it might be easily damaged. The RGB socket will drive both monochrome and colour Olivetti monitors or a **RGB** standard monitor. although additional hardware is needed to give power to the main system if anything other than the Olivetti monochrome monitor is used. A switch next to the RGB socket lets you select between monochrome and colour.

To the right of the ports there are covers for three expansion ports, but these are far too small to be suitable for standard IBM-compatible expansion cards. Unlike the majority of PC clones there is no fan to be found anywhere on the system. This is a sign of good engineering design from Olivetti, as the M19's closely-packed compact design doesn't even get warm. Thankfully, the absence of a fan also means that the unit is silent in operation.

Getting inside the M19 is very

straightforward providing you don't follow the manual: a total of five, not four, screws need to be removed; two at the rear and three at the front. After removing, the screws the cover slides forward an inch and is removed by lifting it at the rear.

The first thing that struck me was the total absence of a power supply — usually the most dominant component of a PC clone. All the power conversion is done within the monitor, so the power wires from the monitor lead directly to the PCB and disk drives.

With no power supply, the most dominant components by far are the two half-height disk drives which occupy over half of the casing towards the front of the machine. The review machine was supplied with two 51/4 in. 360k IBMcompatible drives which were raised an inch above the main PCB by the metal chassis. Interestingly, the controller PCB mounted above the disk drives was the smallest I've ever seen on a PCcompatible. In operation the disk drives performed very well and could hardly be described as noisy; however, they are noisier than those on the M24 which, at least on earlier machines, were whisper quiet. The M19 is also available with a single 360k drive or with a 10Mbyte hard disk and one 360k floppy. However, with a hard disk installed, a fan

In perspective

Cheap IBM PC-compatibles probably represent the most cut-throat competitive sector of the microcomputer business and are currently suffering under a flood of *really* cheap Taiwanese products. The name Olivetti may mean a lot in terms of support when compared with cheap Taiwan clones, but there are some large, reputable manufacturers which make cheaper machines such as Commodore with its PC.

I would recommend a good look round the market before purchasing an M19 as there will almost certainly be a cheaper machine that will meet your needs. For example, one of the markets Olivetti envisages for the machine is the higher end education market, but I doubt that cost-conscious educational institutions will buy the M19 when they could have two identically-configured machines for roughly the same price of one M19.

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is needed to keep the unit cool. The main PCB occupies the entire base of the main system unit, although over half of it is obscured by the two disk drives. Even though it is as big as the machine itself, the PCB is still significantly smaller than that on the IBM PC, although it boasts an RS232 port, a Centronics port and colour display support.

The main processor on the M19 is a standard 8088 which is just a 16-bit processor with an 8-bit data bus. The processor is driven at the mundane speed of 4.77MHz. I was very disappointed at Olivetti's choice of processor and clock speed, as most modern PC-compatibles have followed the lead set by Olivetti with the M24 and used a full-blown, 16-bit 8086 running at 6 or even 8MHz. Olivetti's decision to use exactly the same processor and clock speed as the IBM PC only marginally helps compatibility (once again, Olivetti's M24 shows you can be very compatible at higher clock speeds), but it does make the M19 slow when compared with the competition. Surely, with all the research Olivetti did to make the M24 run at 8 and now 10MHz, it wouldn't have cost too much to give the M19 an 8MHz 8086 as standard. A gofaster option of 8088 driven at 8MHz will be available by the end of July, at extra cost. Certain chips were socketed rather than soldered directly to the board, presumably for this upgrade.

The main PCB looked Well built and considerably less cluttered than I expected, due to the use of a large custom gate array which encompasses several functions including that of a colour card. Although the review machine was a late prototype, there was little evidence on the PCB of it being an unfinished product, except for one small area of TTL logic which was covered in patch wires. A 16k ROM containing the boot-up sequence, ROM BIOS and diagnostics is just visible underneath the disk drives alongside a bank of 256k RAM made up of 256k by one-bit dynamic RAM chips. There is sufficient room onboard to expand the system to a full 640k with parity (the basic system has no parity chips in place, just an empty socket). All M19 configurations come with 256k of RAM as standard.

With three blanking plates on the rear of the case you would expect to find three expansion slots inside; not so, the main PCB contains only two. Odd, and more than a little deceptive. What is worse is that these two slots are totally unable to take standard expansion cards as the space available could accommodate a card with half-card length and a third of the standard height. A dear price



The two, half-height disk drives occupy most of the front panel

to pay for the dinky little compact system box. I don't have enough room with five cards, although I do appreciate that there is no need for my colour card or 80 per cent of my multi-function card.

Olivetti, of course, has cards available in this miniature format, and there is no reason why some of the current cards couldn't be converted as the physical socket is identical to that on the IBM. In fact, Olivetti will shortly announce an Australian-made internal modem for the M19; it features 1200/75 and 300/300 baud rates and is capable of autodial.

Including this modem card, there will initially be five cards available from Olivetti. The other four are: a second RS232C port; a synchronous communications interface; an Olivetti

proprietary local area network card (called Olinet) and, best of all, an SCSI hard-disk controller which will allow you to hang a whole host of third-party mass storage devices on the system.

If you're desperate to use a standard IBM type expansion card, there is one way to do this. At extra cost you could purchase an external expansion box with one slot for a normal expansion card—this box can also be configured to supply power to the main unit, should you wish to use a standard RGB monitor or Olivetti's colour monitor.

The monitor supplied with the M19 was monochrome and was also said to be a prototype and suffering from a contrast problem. Like the main system the monitor is finished in grey plastic,



The rear panel houses the usual collection of IBM-compatible sockets

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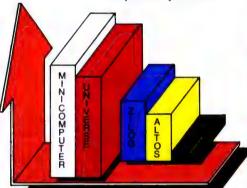
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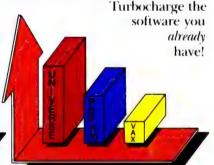
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Benchmark

The benchtest used was provided by BYTE magazine and is the Sieve of Erastosthenes prime-number program (10 iterations). Note that all performance is for a single user system only.

COMPUTER	PROCESSOR	OPERATING SYSTEM	LANG.	TIME (sec.)
AED UNIVERSE	80286/8	MP/M 8/16	C (D.R.I.)	1.8
ZILOG	Z8000	ZILOG	C	4.0
DATAMAX	80186	C-DOS	C (D.R.)	4.3
WICAT	68000	UNIX	\mathbf{C}	4.7
ALTOS	8086	XENIX	C	6.0
LABTAM	8086	MC-DOS	Fortran 77	7.0
DEC	LSI-11/23	XENIX	C	9.3
IBM PC	8088	MS-DOS	C (D.R.)	12.4
OSBORNE	Z80A	CP/M	C (BDS)	15.2
DEC PDP-11/70		UNIX	\mathbf{C}	1.5

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and along the front there are controls for contrast, brightness and the power switch. To my mind the on/off switch is too easy to hit accidentally considering that it's the power switch for the whole system. Also, it's not possible to just switch off the monitor to save the screen, while keeping the computer on - a lesson I learnt the hard way as I lost a few hundred words of text in a moment of foraetfulness.

I also found many operational faults with the monitor, among them a severe ghosting, a crooked display and a most worrying fault which occurred twice, whereby the monitor let out a loud crack and shot a splodge of brightness to part of the screen. I can only add that I hope all this was due to it being a prototype. Interestingly, I found no fault in the contrast; both text clarity and shading to simulate colour graphics were excel-

The keyboard unit on the M19 connects to the main unit via a fairly short length of coiled cable and a DIN plug. This is one area where there seems to be no loss of quality in a effort to keep costs down. The keyboard quality on the M19 rivals the excellence of the IBM keyboard. The keyboard unit is higher at the back than it is at the front, which means it is angled slightly forward to give a good typing stance. This angle can be increased to any one of three settings

by means of flip-down legs at the rear of the unit. A recess at the top right of the unit will accommodate the Olivetti mouse. Although this doesn't conform to any industry standard, both Microsoft and Digital Research, the major mousedriven software producers, support it. And if this isn't enough, Olivetti will sell you software that emulates the Microsoft mouse - the most successful industry standard.

The keys are laid out in three logical groups and roughly modelled on the keyboard found on the PC/XT. The centre section is occupied by the main gwerty typing section which is a slight improvement on the PC/XT's. In particular the '/' key has been moved from its awkward position between the 'Z' and Shift keys; the 'Return' key has been enlarged to a decent size and the 'Shift' keys have been placed in their proper position either side of the space bar.

To the left of the keyboard there are 10 programmable function keys a la IBM PC or AT. To the right of the gwerty section, there is the combined numeric keypad and cursor key cluster. Above this are the 'Num Lock', 'Scroll Lock' and 'Caps Lock' keys, each with their own LED to indicate whether or not they are engaged. Also in this row is the 'Sys' key used on some networks and a key labelled 'PC/WP' which switches the

keyboard configuration to one suitable for a proprietary Olivetti word processing system.

I liked the general feel of the M19's keyboard; the keys themselves were nicely sprung and had a very positive action suitable for touch-typing. Also, the blue on grev colour scheme with amber LEDs makes it one of the classiest looking keyboards I've ever seen - the overall effect is only spoiled by a cheaplooking marbled strip running across the top of the unit.

System software

In order to be compatible, all IBM PCclones run some version of the MS-DOS operating system, usually version 2.11. The Olivetti M19 sticks strictly to this tradition by including a 'no frills' version of MS-DOS 2.11. This is all very well but it does make it very difficult to think of anything substantial to say, without repeating what has already been said and written many times before.

Seriously though, compared machines with a similar specification, the M19 isn't cheap and I would have expected a company with the corporate power of Olivetti to sign up one of the friendly front ends' - such as GEM or Windows — to be bundled-in with the machine, something which small, cheap clone manufacturers don't have the power to do.

Applications software

Being IBM PC-compatible, the M19 is open to the widest range of application programs ever to be made available on a single machine architecture although some people believe there is still a greater number of packages available for the CP/M operating systems. Even if this were true, IBM PC packages are far more modern and better supported, so,

Technical specifications

Processor: ROM:

8088 running at 4.77MHz

256k expandable to 640k on board RAM:

Mass storage: One or two 360k IBM PC-compatible floppy disks.

Optional 10Mbyte hard disk 85-key, IBM PC/XT style

Weight:

Keyboard:

1/0:

RS232C, Centronics and RGB ports. Two non-IBM-

compatible expansion slots

DOS: MS-DOS v2.11

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whatever application you want, from spreadsheet to golf-handicapping system or word processor to bakery control program, if it's not on the IBM PC the chances are it's not available.

Olivetti's previous PC clone, the M24, set a reputation as one of the most compatible machines available and included a different and faster processor to the IBM PC. One would expect the M19, with the same processor as the IBM PC driven at the same speed, to be even more compatible. I tried a wide range of programs on the M19 from the office collection, and everything ran perfectly, including the classic tests of compatibility such as Microsoft's Flight Simulator and Lotus' 1-2-3 (though all the clone manufacturers now ensure that their machines run these). In general, the Olivetti is one of the most compatible machines on the market today.

Incidentally, when I ran the APC Benchmarks, I initially tried to use the PC-DOS from my machine and IBM's BasicA. The M19 happily ran PC-DOS but, like all compatibles, failed to run BasicA as this uses Basic ROM routines which are strictly copyright IBM.

A quick search through the disks supplied with the M19 turned up a copy of GWBasic which is the only application supplied with the M19. Curiously, the Benchmarks are slightly faster than those for the PC, which must mean GWBasic is a faster Basic than BasicA.

Documentation

The review machine was supplied with one manual called the M19 Starter Kit which also contained three disks. This was spiral-bound, typeset and made heavy use of diagrams throughout. However, it really isn't enough for the absolute beginner and would be more useful as a simple setting-up guide and sales brochure for Olivetti's peripherals.

The three disks consisted of a



The monitor has controls for contrast, brightness and the power switch

Tutorial/Introduction to the M19 — which made up somewhat for the lack of this information in the manual — a system disk and a diagnostics disk.

Prices

As is so often the case, the price of the machine wasn't fixed at the time of writing. The best estimate at this time is that the recommended retail price of the basic single floppy drive M19 will be around \$2800. This includes a monochrome monitor; the dual disk drive system should sell for about \$3200. No prices were available for the hard disk, expansion cards, peripherals and so on.

Conclusion

The M19 is a very well made, good looking PC clone, but that alone is insufficient to set it apart from the crowd. Having the Olivetti name behind it means

the machine will be well supported but I really don't think that's enough considering its cost.

Olivetti sees the machine selling to a very distinct section of the market, including the executive who doesn't require too much computing power but wants a neat, compact unit and a terminal for a network. But even in this market there are better, and cheaper, machines. The omission of standard expansion slots is the machine's most worrying flaw which seriously effects its capability as a general purpose PC clone.

Overall, the machine is a disappointment, especially coming tom Olivetti which had previously produced such a good machine in the M24. If the company had included the fast 8MHz processor and a friendly operating system front-end such as GEM, with no increase in price, this might have compensated for the lack of expansion slots and made it a viable proposition.

Benchmarks BM1 1.4 BM₂ 4.9 10.4 вм3 10.8 **BM4** 11.5 BM5 20.8 **BM6** 32.4 **BM7 BM8** 34.3 15.8 Average All timings in seconds. For a full listing of the Benchmark



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Pictures from space

This month Robert Mudge explains how, among other things, you can receive pictures from weather satellites by connecting your micro to the radio receiver.

The old joke about 'Colour Radio' isn't as far from the truth as you might think, because pictures were sent by radio long before the start of television transmissions just after the Second World War.

Facsimile machines

In 1934. Britain's BBC sold a kit to build a facsimile machine: a device to make pictures by radio. At the BBC transmitter, pictures were scanned electronically and broken down into a number of parallel lines. These were sent sequentially as an audio signal varying in volume to represent the pictures' dark and bright bits. The facsimile machine was connected to the radio and reassembled the lines onto a piece of electricallysensitive paper, recreating a replica of the original picture. This method of transmitting pictures by radio has been used extensively, and for a long time, by the world's press agencies who distribute their news pictures across the globe by short-wave radio. Anybody with a suitable receiver and facsimile machine can pick them up ready to print alongside text, probably sent by radio telegraphy.

Mechanical fax machines are expensive precision devices, but it is possible to find them second-hand in electrical junk shops — however, you have to be a capable enthusiast to get them going. Within the Wireless Institute of Australia there are people and groups who specialise in fax. The WIA is represented in all states of Australia. If you can't find them in your local area, contact the Federal Office in Melbourne.

Professional facsimile machines are expensive, but by linking a modern

short-wave receiver to a home micro, amateur radio enthusiasts can transmit and receive pictures between each other at a fraction of the cost. Short-wave listeners can tune into these, and even into pictures transmitted by weather satellites 34,000 kilometres up in the sky.

This type of picture transmission is a kind of Slow Scan Television (SSTV). Our normal television produces a complete picture every 25th of a second, and each picture is made up of 625 lines. It needs to show this number of lines at this speed in order to create high-quality moving pictures.

Operation

To make each picture, a tiny spot starts at the top left of the television screen and sweeps across to the top right, getting darker and brighter as it goes so as to recreate dark and bright bits of the real scene. It then switches to the left again but a line lower. This process goes on until the spot has scanned the entire screen and reaches the bottom right corner, at which point the spot goes to the top left again to start a new picture. In reality the process is a little more complicated because the television shows the same picture twice: the first time using all the even-numbered lines. 312.5 in all; and the second time all the remaining odd lines, the other 312.5. Each of these is called a field - each field takes 1/50th of a second, so the two fields are shown in 1/25th of a second. However you look at it, that spot is moving very fast: it has to cover 625 lines in 1/25th of a second, so each line takes about 0.000064 of a second!

It all works well, but the radio signal

has to be very high, from 50 million Hertz (50MHz) to one thousand million Hertz (1Ghz). It must be capable of carrying a frequency of about five megahertz (5MHz bandwidth) — this takes up a lot of radio room. The short-wave bands only go up to 30MHz and typically carry a frequency (bandwidth) of about 3KHz (3000Hz). This bandwidth is good enough to carry voice transmissions and narrow enough to get lots of channels into the available radio space. To transmit pictures by short-wave, the amount of information has to be reduced. This is done by reducing the speed of the line scan and also the number of levels of grey that make up the picture.

With the older systems, and most of the press transmissions, a photograph is loaded onto a drum in the facsimile (fax) transmitter. The drum then rotates at a fixed rate (60, 90, 120 or 240 revolutions per minute). Synchronised to the drum is a scanner which slowly moves along the length of the drum. The scanner usually consists of a light source and a photoelectric cell. The light shines onto a tiny spot of the photograph and the photoelectric cell picks up light which is reflected from its surface. The strength of the current coming from the cell depends on the brightness of the photograph at that point; the current is used to vary the volume (modulate) of an audio tone (about 2.5KHz), which is then transmitted on the chosen frequency.

At the receiver, a piece of electricallysensitive paper is placed on a similar drum. As this rotates, a stylus rests on the paper and an electric current proportional to the loudness of the audio signal is passed through it. The higher the current, the darker the paper, and,

COMMUNICATIONS

gradually, a facsimile of the original photograph is produced. There are numerous types of machines which may use different paper, including ordinary photographic bromide paper — but whatever the machine type, the principal operation is the same.

Information

There are a few other pieces of information needed before a picture can be successfully produced. Both drums must rotate at the same speed, and they must also be synchronised so that the edge of the picture appears at the correct place — it's no use if the edge appears smack in the middle of the receiving sheet. To do this, a synchronising pulse is included in the audio signal. When a transmission starts, there is usually a short period when only the synch pulses are transmitted (this ensures that the receiver drum has time to become synchronised to the transmitter).

The other essential thing is that the scanners on the transmit and receive machine both move at the same speed and so produce the same number of lines per millimetre. This is called the 'index of co-operation' (IOC). There are two fax standards: 576, which gives 3.9 lines per millimetre; and 288, which gives 1.9 lines per millimetre. The higher the number of lines per millimetre (scanning density), the higher-definition the picture. If the wrong IOC is used, the received picture will be distorted.

Enter the micro

For home enthusiasts and amateur radio enthusiasts, the microcomputer has taken over. Using a computer is simpler and much cheaper. The photograph is captured from a television camera in a digital frame store, and is then read out line by line at the appropriate rate. The digital brightness levels are used to modulate the audio tone, via a digital to analogue converter, which is then transmitted. Synch pulses are inserted at the beginning of every line, along with information to stop and start the receiver. At the receiver, the audio tone is used to generate a picture in the frame store via an analogue to digital converter, where it is then displayed on a visual display unit. Once in the frame store, the image can be printed onto paper using a dot-matrix printer.

There are a number of line standards for amateur SSTV, but the most popular is 128 lines by 128 pixels with 16 levels of grey between black and white. It takes seven seconds to transmit a picture like this and it looks almost as good as a newspaper picture. Other standards use



From a plain coat . . .



Before . . .



Italy's weather in mono



A leopard's black & white spots



.. to a technicolour coat



... and after



Italy's weather in colour



Shaded weather conditions

A selection of pictures obtained from a microcomputer and a radio receiver.

more lines and pixels to increase the quality, but because they still have to be transmitted with the same bandwidth, the line rate has to be even slower in order to fit in the extra information — a

256-line by 256-pixel picture taking 32 seconds to transmit.

There are a number of dedicated digital SSTV systems on the market; the most popular is the ROBOT 1200c. This

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system can also transmit colour pictures and was used onboard the space shuttle 'Challenger' by astronauts Tony England and John-David Bartoe to transmit pictures from the shuttle to the world's amateur radio enthusiasts. This system costs well over \$3,000, so is out of the reach of most enthusiasts. However, there is a much cheaper system which runs on the MicroBee, Commodore 64 and Apple micros.

The 'Listening Post' is a good introduction to RTTY, Fax and Morse code. This unit was designed by an Australian radio amateur by the name of Tom Moffatt (his amateur radio callsign is VK7TM). It was published as a project in the July 1985 issue of Australian Electronics Monthly. There is a 'kit of bits' available from All Electronic Components in Melbourne. This kit has only 1 integrated circuit, 2 transistors and a few other components: it's very easy to build and costs just over \$30. Some software is available with the kit, but programs for the MicroBee, Commodore 64 and Apple micros can be bought from Australian Electronics Monthly on disk (or cassette) for approximately \$20.

The system is very easy to use, but finding the pictures on the short-wave bands and tuning them can be tricky and requires practice. Fax broadcasts by press agencies and other utility transmissions, such as weather maps, usually follow a published time-table amateur SSTV transmissions happen randomly, and so some searching of the amateur bands will have to be done, sometimes fruitlessly. SSTV signals sound quite different from anything else. They can be quickly differentiated from the rest of the coded signals like RTTY (Radio Telegraphy) and TOR (Telex over Radio). A couple of good frequencies to try in are 11.030MHz and 13.550MHz. These frequencies primarily carry fax transmissions of weather maps for Australia and New Zealand.

Satellite transmission

For the listener there is another source of interesting pictures: those transmitted from space by weather satellites as they pass overhead. For 25 years, orbiting satellites have been sending pictures back to the earth which show the movement and position of clouds. The information is used by meteorologists to help in their daily weather forecasting. The equipment used by the professionals is similar to the mechanical fax equipment and is very expensive, but the system on the space-craft was designed with the amateur in mind.

The simplest satellites to receive are the American NOAAs. They are in a polar orbit, which means that they pass over the North and South Poles. As they go around, the earth rotates below. They pass directly over any point on the earth's surface twice a day: once in light, the other in darkness.

Onboard is an SSTV system which sends a picture in a continuous strip. There are two pictures side by side one shows the surface of the earth in visible light, the other in infra-red. Technically speaking, this system is called Automatic Picture Transmission, or APT. The picture is sent at two lines a second as an amplitude (volume) modulated audio tone. You need a special receiver to pick it up because it is on 137.62MHz, and in FM (Frequency Modulation) is well above the range of most short-wave receivers. The line scan on the satellite is crystal-controlled at two lines a second.

Accessible from some parts of the

earth an interesting alternative satellite is 'Meteosat', a geostationary satellite about 34,000 kilometres above the equator. Geostationary satellites travel at the same speed as the earth rotates, and so appear to stay in a fixed position above the earth's surface. Unlike the Polar orbiting satellites which only pass overhead twice a day, Meteosat transmits pictures of the earth all day. Every half hour it takes a picture of the whole earth, in both visible and infra-red light. This is transmitted back to earth where it is enhanced and the coastal outlines are put onto the picture. The picture is split into a mosaic of nine elements which cover the whole earth; each of these pictures is made up of 800 lines. The enhanced picture is sent back to the satellite which then retransmits it for general use using a four-lines per second APT format.

Equipment to receive fax pictures from satellites such as Meteosat must be able to function on frequencies in the order of one and a half thousand million Hertz (1.5GHz) or more. It must incorporate a fair sized dish antenna and some rather fancy electronics. You and I can't afford it, though a radio amateur skilled in these areas would be able to build it 'on the cheap'.

In Britain there is a group dedicated to receiving fax transmissions from satellites and other areas. Called the 'Remote Imaging Group', it publishes a quarterly magazine and is ready and willing to help anyone wishing to receive satellite pictures. With a subscription of only two British Pounds per year, it's well worth joining.

The pictures produced by computer are very good. If you thought computing was addictive, just wait until you start on satellite pictures.

Contacts

Wireless Institute of Australia Federal Offices 3/105 Hawthorn Rd. (PO Box 300) Caulfield North, Vic 3162

Listening Post Software Australian Electronics Monthly PO Box 289, Wahroonga, NSW 2076 Enquiries: (02) 487 2700.

All Electronic Components 118-122 Lonsdale St. Melbourne Vic 3000. Enquiries: (03) 662 3506.

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Turbo Lightning

Borland's combined spelling checker, proof-reader and thesaurus incorporates basic word processing facilities and some rather novel options.

Owen Linderholm perfects his writing style.

Amstrad's word processing computer. the PCW8256, has fanned the flames of interest in word processors to an unprecedented degree. In the US, plain word processing is almost as obsolete as the typewriter. Corporate America has bought its IBM PCs, and now it wants more from them than the simplest office functions. Spreadsheets should automatically extract information from raw data, and display pretty and meaningful graphs. Databases should be intelligent, and should understand Enalish commands. Word processors should check your spelling, grammar and writing style, and preferably correct them, too. Not all of these things have been achieved yet, although various companies claim to have products which can do all these and more.

Turbo Lightning, the latest addition to the low-priced Borland range, is primarily a spelling checker, a thesaurus and an automatic proof-reader. Borland says that the package can do much, much more, and does provide some evidence to support its claim. The package is currently available for the IBM

The soft and action of the soft action of the soft

Lightning's list of sound-alike words

PC, and compatibles with at least 128k and two floppy drives or a hard disk. It has the potential to run on any MS-DOS system (and perhaps CP/M, eventually) with sufficient memory.

Turbo Lightning features the usual Borland packaging — a paperback booktype manual accompanying three disks which hold the software. The inclusion of the word Turbo in the product's name suggests that it is heavily linked to Borland's successful Turbo Pascal. On the surface, the name is the only piece of evidence for this, but reference is made in the manual to interfacing between Turbo Editor and Turbo Lightning, Turbo Editor is a series of modules, written in Turbo Pascal, to build up word processors or text editors. One of the Pascal modules hooks into Turbo Lightning to allow spelling checking of a different type from Turbo Lightning this suggests that Turbo Lightning was itself written in Turbo Pascal, an incestuous relationship which may extend to several Borland products.

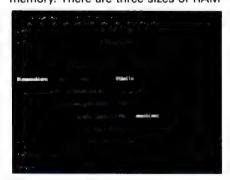
The Turbo Lightning disks contain various files which perform different



A selection from the Thesaurus

functions. The system disk holds the Lightning files; a floppy disk version of the Random House dictionary; a floppy disk version of the Random House thesaurus; a very small version of the dictionary to fit into a small memory space; an auxiliary dictionary; and some last-minute update information. Another disk, the dictionary disk, holds the complete dictionary and thesaurus. The last disk contains a selection of dictionaries to fit into memory; a hard disk installation program; the Lightning installation file; and a few environment files with which to configure Lightning for various purposes.

This list of disk files indicates that Turbo Lightning can be used on systems with various memory configurations and a floppy or a hard disk. The Turbo Lightning program plus window buffers, dictionary indexes, the auxiliary dictionary and display storage occupies 65k to 70k, depending on whether or not the screen is blanked while Lightning is in use. Five sizes of dictionary can be used, each using up different amounts of memory. There are three sizes of RAM-



Full-Screen Spell Check

resident dictionary, ranging from 6000 words through to 12,000 words to 16,000 words; these take up between 16k and 38k of memory. The other two dictionaries are based on disk, but can be transferred to memory if enough is available. The smaller of these dictionaries, for use with floppy disk systems, has approximately 50,000 words and occupies 106k if placed in memory. The largest dictionary, for use with hard disk-based systems, or systems with RAM disks or with large amounts of memory, has about 80,000 words and takes up 175k.

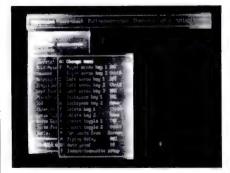
Menu selection

The mechanics of using Turbo Lightning are very simple. An installation program sets it up for use with your particular system; then, when the program is run, it sets itself up in memory in the background. The program can operate in various modes which can be altered according to the user's preference. In normal operation, Turbo Lightning is invisible until it is required. It can be activated either through a menu system or via hot keys which call up functions instantly.

The main menu appears as a one-line window at the top of the screen. The options listed are: Environment, Word Check, Full-Screen Check, Thesaurus, Set-up and Options. Each of these options can be accessed by the left and right arrow keys and the Enter key, and pulls down another sub-menu of the functions available under that heading. Each of the items on the sub-menus can be accessed by single-letter indexes or by the up and down arrow keys and the Enter key.

These menus pull down over anything else that is on the screen; when they are removed, whatever is underneath is replaced. One of the Set-up options allows the whole screen to be changed when a menu drops down, and this saves a small amount of memory.

The Environment option is used to select the working environment for Turbo Lightning. Several common appli-



Environment Set-up



SCREENTEST

cations are already set up, such as WordStar, DOS, Lotus 1-2-3, Multi-Mate, communications, Turbo Pascal, and so on. These Environments can be modified or changed completely and then saved for further use.

Environment controls the keys which are to be used as cursor keys; deleting keys; inserting keys; and how insertion and deletion work under that application. When Turbo Lightning is configured for new Environments, some of these values have to be discovered by trial and error, but they are all required by the program so that it can replace words correctly without altering the format of whatever is being worked on.

The next item on the menu is Word-Check, the use of which is obvious. The options under this item check the word at the cursor position and also check the last bad word; when the former option is selected, Turbo Lightning checks the word on which the cursor is placed, or the nearest word if the cursor is not on a word. A window appears in the corner of the screen furthest from the cursor, and contains a list of possible words to change or a confirmation of correct spelling.

When the spelling of a word is checked in the dictionary and found to be incorrect, Turbo Lightning produces a list of possible correct spellings in the window. These possible words are culled from the dictionary according to a few simple rules — the program calls this list a 'sound-alike' list. The words are organised according to the words which Turbo Lightning thinks are the most likely configurations. The means of coming up with possible alternatives involves a list of commonly misspelled or mistyped words, the sound of the words and their length. Borland's reasoning behind this policy is that when people incorrectly spell a word, they guess at the correct spelling along phonetic lines.

This is perhaps a misguided policy on Borland's part, as almost all *my* typing mistakes are the products of clumsy fingers, not poor knowledge of spelling. If I frequently type a nonsense word like vyte in place of byte, for example, Turbo Lightning will produce vote, voted, voter, votes, vitae and vacate as the six most likely alternatives to the wrong word.

The phonetic replacement stragegy is,

however, not taken far enough. Silent 'p's and 'ph' sounding like 'f' are common phonetic mistakes, but Turbo Lightning produces a list of words which are approximately the same length as the misspelled word, and which all begin with the same letter and have varying changes made to the other letters. The only exceptions are short, common words such as 'the', 'what', 'why', and so on; mistakes related to these words are analysed as wrongly-ordered words, and the correct words are produced.

Another method of checking spelling via Turbo Lightning is to check words a screenful at a time; this is the third option on the menu bar. There are two suboptions available from this selection — Full-Screen Check and Review Last Full-Screen Check. The Full-Screen Check scans every word on the screen and highlights any which have been misspelled. The Review Check option reviews the results of the last Full-Screen Check and re-highlights all the misspelled words unchanged since then.

Perhaps the most useful feature of the Turbo Lightning spelling checker is the Thesaurus option, which has no suboptions attached. It looks up the word which is underneath the cursor in the Thesaurus, and provides a list of alternative words or phrases of the same meaning. If the word is not in the Thesaurus, then you are given the option of finding a sound-alike word. This is a very useful feature, as it allows the Thesaurus to look at words which have been derived from Thesaurus-resident words. The Thesaurus is convenient and easy to use and provides plenty of inspiration if the exact word just won't spring to mind.

Turbo Lightning can be configured to some extent from within the program. The Set-up option is called, and allows the auxiliary dictionary name to be changed, as well as the names of the main dictionary and Thesaurus. These changes, plus any changes made to the Environment and Options items, can be saved.



A correct spelling

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A VAX/VMS version of Modula-2 is also available.



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The final item, Options, allows the automatic proof feature to be switched on and off, as well as the Confirm window. This is the window which displays a message confirming that a word is spelled correctly. The hot keys which directly access Turbo Lightning may also be changed via this menu option.

Modes

Turbo Lightning operates in three basic modes, the first of which is a straightforward spelling checker. This operates on single words, or on a screenful of words at a time. It can also be accessed via the undocumented Lightning Engine interface which Borland has so far kept shrouded in mystery. Turbo Editor uses this interface to check immediately the spelling in a whole document, using optional query and replace, and has all the features expected of a spelling checker, which are missing from the basic Turbo Lightning program.

Auto Proof is a novel option. Borland claims that this part of the program acts as an automatic proof-reader but, in practice, it checks the spelling of each word as it is typed. When you have finished a word and enter a space, a full stop, a coma, or whatever, Auto Proof checks the word and beeps at you if it thinks it is incorrect. This allows a correction to be made, or the last-badword function can be utilised by hitting a key, and a list of suggested correct spellings will appear. So, Auto Proof mode is effectively a check on spelling errors made as you type, which turns out to be very useful for catching all those little errors such as seperately (BEEP) whoops, that should have been separately.

Weaknesses

Turbo Lightning has several faults. Firstly, there is the common complaint about all American programs — their idiosyncratic spelling. The result is that the precious space (about 200 words) available in the auxiliary dictionary has to be filled with spellings of words such as colour and realise (American - color, realize), which reduces the number of technical words that will fit. (Turbo Lightning would also have been considerably improved by the addition of a facility to check a whole document from within the program, instead of forcing the addition of an extra program to interface with its internal workings.)

Turbo Lightning is difficult to use with a 256k, dual-floppy system because the disk-based dictionary has to be resident

in one of the drives for the program to be of much use. This limits other activity to one disk drive, which can be awkward. I was forced to keep files very small, or resort to disk-swapping.

Conclusion

This Turbo Lightning spelling checker, thesaurus and proof-reader is only *one* application of the Turbo Lightning Engine, if Borland is to be believed. A technical appendix to the manual states that Turbo Lightning can be called by other programs, and so can be used as a tool to enhance their facilities. The purpose of the Engine is to allow quick, easy access to large reference databases of all sorts, but apparently the only limitation is that the databases must be based on words, which means that access to numerical information is not allowed

Access to all information depends on data compression, which reduces the data to small chunks which Lightning can handle. Lists of keywords are used to access the information, and are compressed into an index file. There is more technical information in the index. all of which indicates the general workings of Turbo Lightning but describes nothing in any particular detail. This capability has been reserved for the future, and mention is made in the Read.me file of a package called Turbo Wordgames which will be a set of Pascal programs with hooks into the Lightning Engine, plus descriptions of how the programs work.

The Turbo Editor package does already have a simple hook into the Engine, but it

is a very simple one and no explanation is given as to how it works.

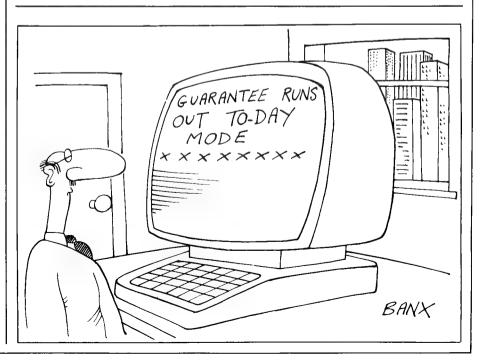
One possibility for the implementation of this kind of software is for help in accessing compact disk information systems. Borland's founder, Phillipe Kahn, recently addressed a conference in the US, organised by Microsoft, on compact disk systems, which suggests that Borland has considerable interest in this area. One obvious step is to use Turbo Lightning, or similar programs, for access. Compact disks lend themselves to storage for encyclopedias, for example, due to storage problems. As compact disk systems, or worm drives, can only be written-to once, it makes sense to input a large volume of data in an orderly manner: the combination of compact disk and Turbo Lightning is, potentially, a powerful one.

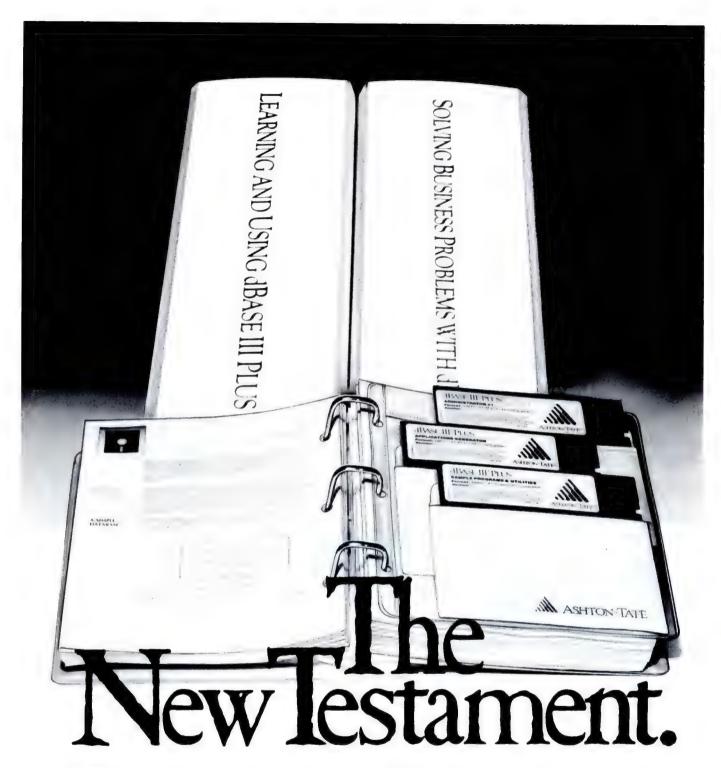
However, this is all speculation, and, for the moment, Turbo Lightning only has one basic purpose: it is useful for anyone who does a lot of typing on a computer, and who is likely to make many spelling mistakes. It is also useful for anyone who uses a word processor, and who requires swift access to a thesaurus. But for other purposes, even when checking the spelling in a whole document, Turbo Lightning has limitations.

As Turbo Lightning has a great deal of potential, it may well be a product to keep in the back of your mind for the future.

Turbo Lightning costs \$175 and is available from leading computer suppliers.

END







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Although it was first contracted in a hospital, the Mumps we look at here is a database language rather than a popular disease. Mumps, however, is a database system with a difference. Ian Davies takes a look.

In some ways, Mumps is 30 years behind the state-of-the-art in data management systems. In other ways, it's 10 years ahead. In either case, Mumps takes a dramatically different approach to most other products on the market, and is worthy of careful examination by anyone thinking of designing their own DBMS.

Mumps was developed in the 1970's at the Massachusetts General Hospital, and derives its name from the MGH Utility Multi-Programming System. It was designed to be highly interactive, simple to use, multi-processing and efficient. Like many DBMSs, Mumps attempts to broach the 'end-user computing' hurdle, providing facilities so powerful and so easy to use that anybody can start performing productive work after a few hours introduction.

The two major selling points for Mumps are programmer productivity (two to five times normal throughput), and the ease with which applications can be transported to other machines. Mumps even has standards set by the ANSI organisation which cover all implementations. The version of Mumps under review is called CCSM, developed by Comp Computing of Houston, Texas. CCSM follows the ANSI standard Mumps, and is written for MS-DOS machines.

Overview

I like to think that most data management facilities have their own flavour, or feel. Mumps is definitely one that does. Its emphasis is on simplicity, regularity, brevity and multi-programming. In some ways, this makes it similar to Unix — even though one is an operating system and the other is a DBMS, they both 'feel' to have similar design objectives.

Mumps insulates the user from the host operating system. Indeed, Mumps provides its own operating environment, utilising pre-formatted MS-DOS files as its own virtual disks. Thus to the user, file names, directories and volumes bear no resemblance to the MS-DOS standards.

"The two major selling points for Mumps are programmer productivity (two to five times normal throughput), and the ease with which applications can be transported to other machines."

Special Mumps utilities must be used to rename, delete, print or copy files, whether they be data files or programs. Everything resides within the Mumps virtual disk files, and only Mumps can operate upon them. This is probably not a bad approach for a DBMS with a heavy emphasis on multi-programming, as MS-DOS provides no real facilities for record locking, multi-tasking or contention detection.

The user, once within Mumps, can forget the normal operating system. Even the Mumps editor, ZE, is the only one which can be used without first copying programs out to operating system files.

Multiple users are supported by means of serial ports, with a maximum of

16 being supported. The Quadram serial port cards are used to expand past the normal limit of two serial ports on PC compatible machines. Any type of vaguely smart terminal can be plugged in and used.

The Mumps language is slightly Basiclike, and the DBMS — well, the DBMS is something else.

DBMS

The DBMS isn't.

This is one of the most characterising, interesting and powerful features of Mumps.

Consider, for a moment, the problem facing most DBMS's. Programmers want to insert records, delete records, find records, update records, and utilise various abstract ideas such as indexes. In addition to the DBMS language providing facilities to operate on normal variables (memory variables, working storage, local variables — call them what you will), it must also provide operators to affect the database. Thus the average DBMS language has two distinct sets of operators — one for working on the database, and one for working on nondatabase items.

Even the data structures are duplicated (not in the dBases of the world, but certainly in the fatherly figure of COBOL/IMS). Added to this are the concurrent update considerations. Often something which is non-database must be placed in the database simply so that collision detection can be used.

Mumps does away with all of this. A revolutionary idea which simplifies data processing by one whole dimension.

Mumps does not differentiate

SCREENTEST

```
PROGRAM: COMFIL
           ;MG,,,;9AUG85 1:45PM;DATA BASE PROGRAM;
K W #
R !,"DATA BASE",!,"ENTER '*' OR SEARCH KEY: ",IN,!
G:IN=**" ENT Q:IN="" S NM=""
COMFIL
START
           R :, "DATA BASE", |, "ENTER "* OR SEARCH REY: ", 1%, G:IN="*" ENT Q:IN="" S MM="" |
S MM=$O(^(PER(NM)) G START:NM="", SCH:^PER(NM)'[IN
SCH
           PRT
CHANGE
INPUT
                -- BAD FORMAT -- PLEASE REENTER", ! G INPUT
TAB
            : NAME: X?2.A.E: NM
            :STREET; X? . E : STR
            ;CITY;X?2.A.E;CI
            ISTATE: X72. A. E: STA
            ;TELEPHONE NUMBER; X?3N1"-"4N! (X?1"("3N1")".1" "3N1"-"4N);TNO
            : COMMENTS: X? . E : COM
```

Fig 1: A simple Mumps database program.

between database variables and memory, or working storage, variables. Everything looks like a memory variable, and thus only one set of operators are provided and must be learned. The only distinction is between local variables (which only you know about), and global variables, which name is prefixed by '^, and which every user knows about.

So far so good, but what about traditional records, indexes, searching, and so on. All this is dispensed with as well. Instead, the normal array construct is the heart of the DBMS. It works like this:

Any variable, local or global, may be subscripted — thus forming an array. The subscripts however, are not just

Commands:	BREAK ELSE HALT JOB NEW READ VIEW	CLOSE FOR HANG KILL DPEN SET WRITE	DO GOTO IF LOCK GUIT USE XECUTE
	ZASSIGN ZGO ZE ZP	ZASSIGNJ ZLOAD ZH ZU	ZFLUSH ZONLINE ZI
Functions:	\$ASCII \$EXTRACT \$JUSTIFY \$ORDER \$SELECT \$VIEW \$ZZ	\$CHAR \$FIND \$LENGTH \$PIECE \$TEXT \$ZNAME	*DATA *FNUMBER *NEXT *RANDOM *TRANSLATE *ZORDER
Graphics:	\ARC \CIR \DELBOX \DELLN \DISPLAYD \FLOOD \GREAD \INITTCUR \INITTCUR \INITMASK \LNREL \MHCURABS \MOVEREL \PIE \RBOX \RLNREL \SETCOLOR \SETGPRIN \SETLNSTY \SETSALC \SETSTANG \SETTXCLR	\BAR \CLOSGRAF \DELCIR \DELTCUR \FCIR \FLOOD2 \GWRITE \INITORAF \LNABS \MARKABS \MHCURREL \MTCURABS \FTABS \RCIR \SCROLL \SETDEV \SETHTSTY \SETLNWID \SETFERN \SETWORLD \SETFEXT \SETWORLD \SETFEXT	\BOX \CLR \DELHCUR \DISPLAY \FILL \GPRINT \INITALPH \INITHCUR \LNJOINT \MAKKREL \MOVEABS \MTCURREL \PTREL \RLNABS \SETASP \SETFONT \SETFONT \SETFONT \SETFORT \SETFORT \SETFORT

Fig 2: Mumps language summary

restricted to numbers — alphanumerics such as a name or an address can be used as well. To make this work, the arrays are sparse matrices implemented as B-Trees. This means that only those elements which are actually used are actually stored. Normally this involves some degree of searching, but by using a B-Tree, the search overhead is greatly reduced.

Thus to find a record, it is simply a matter of subscripting an array with the desired key values.

Everything in Mumps is implemented in virtual memory, thus global variables retain their values with the power switched off. Even programs are handled the same way. In fact, early versions of the Mumps editor were written in the Mumps language.

It's really quite disconcerting to scan through a DBMS reference manual and not find any of the traditional operations such as find, insert or delete. Mumps does provide Open, Close, Read and Write commands, but these are not used in the normal way. In fact, a complete database style application can be written without any disk Read or Write statements.

Additionally, Mumps approaches data types in the same way — something which modern DBMSs are now tending to do. Very simply, data types do not exist. All variables are alphanumeric, it's just that some variables happen to contain valid numbers and, when they do, arithmetic can be performed upon them. Thus alphas can be concatenated with numbers freely. The data type is coerced depending on the context and the current value.

It's all really quite clever. Even the foundation of all modern database systems — the record description — is missing. Experience has shown that it is a good idea for the structure of a database to be described in one place only, and for the programs to be as independent of the structure as possible. Mumps not only does away with the database definition, it also does away with any form of record layout — even something as rudimentary as a Basic Field statement.

Mumps is described in the glossies as being able to accurately model real world hierarchical data relationships. Even the way it does this is simple, neat and concise. Effectively, each extra level of array subscript forms the next level down in the hierarchy. Normal hierarchical database rules apply, in that it is not possible to set a value for PEOPLE(DEPT,EMPNO) unless the department already exists. Similarly, deleting PEOPLE(DEPT) will also delete all employees in that department.

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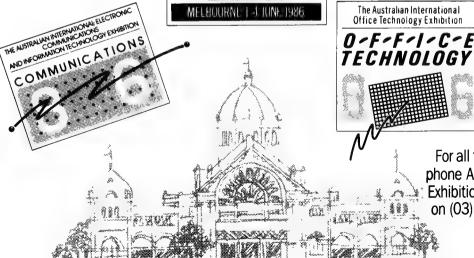
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SCREENTEST

The only real weakness with the whole approach is that secondary indexes are rather hard to arrange. It is possible to create an inverted file, and this can be an auxilliary file which constitutes a secondary index, but it must be maintained through your software.

Language

Since Mumps provides a total operating environment, the application programmer cannot use his favorite language to drive the DBMS. Instead, the integrated Mumps language must be used.

The language is one of the smallest around, consisting of only 22 commands. The main commands are Do, to start a program running; Set, which is similar to the Basic Let statement; Write to display on the screen; and Goto. All commands can be abbreviated to their first letter. Other commands include For, If .. Else, Read for terminal input and Lock.

Functions include \$ASCII, \$Char, \$Extract for substring slicing, \$Find for string searching, \$Justify, \$Length, and \$Random. All function names can be abbreviated to one or two characters. Conspicuous by their absence are all the normal trigonometric and mathematical functions usually found. Two special functions, \$Order and \$Next provide the

ability to search the arrays. Since the array subscripts are not simple integers, it is not always possible to use a For loop to search an array; for example, FOR NAME="ADAMS":"ZAPHOD" does not really make sense. These functions return the next subscript in the machine collating sequence.

Binary operators provided include the normal four functions: modulo division,

"Everything in Mumps is implemented in virtual memory, thus global variables retain their values with the power switched off."

integer division, relational operators, string concatenation, extended pattern matching and boolean conjunctions. The customary exponentiation operator is, however, omitted.

A multitude of system variables is provided for testing I/O results, terminal configuration and the like.

I found the language quite difficult to use at first, mainly because of its somewhat dated parsing standards. For example, if the syntax requires a space between two items, such as "SET A=...", then there must be exactly one

space — any extra and a syntax error results. Similarly, if a space is not necessary, such as following an equal sign, then you should not put one in. I'm sure that it's just a matter of getting used to it.

Unfortunately, it seems that Mumps programmers really like to abbreviate commands to the one or two character minimum, thus making the average Mumps program quite unreadable, as you can see in Fig 1.

A graphics version of Mumps is also available, taking the form of extended options on the Write command. The graphics are almost as powerful as in Microsofts' GWBasic, so you can build almost anything you like, just don't expect to generate bar charts on demand. It's definitely a 'do-it-yourself' situation, (like the rest of Mumps).

There is no screen painting facility—not even to the extent that dBase provides, and there is no sort command. Either you've got to make sure that the array subscripts store the data in the order you want to see it, or you've got to write your own sort routine.

While this approach of an 'operating environment' is all very well, you need to be sure that it's done properly, and it may not have been in CCSM. I tried to load an array where the total size was greater than the virtual disk volume. The result was a complete system hang. Upon rebooting, it seemed that CCSM had managed to overwrite some of its own initialisation code. Every attempt to start CCSM resulted in syntax errors in system routines. To recover, I had to recopy the virtual volume from a floppy, thus losing everything I had placed in it. The moral of the story is, don't let your virtual volumes fill up.

The editor, ZE, is also something a little less than people have come to expect these days. It is a full screen editor, providing average editing facilities, yet includes some oversights. For example, the area of each line preceeding the first tab is reserved for labels, but it is not possible to edit this part of the line. One nice touch is that ZE prompts you for a system name, programmer initials and a few other pertinent details which it stores in the program for you.

Utilities

A whole range of utilities are included in CCSM Mumps. Some of these are implemented as Mumps programs; for example, Snoop to see what's going on in the system, multi-tasking-wise. The majority, however, are accessed through the ZU command, which is an entire utility subsystem. ZU provides facilities

```
Max File Size
                                      30 Mb (DOS Limit)
Max number of fields
                                      limited by disk space
Multi-user
                                      Yes
Multi-tasks
                                      Yes
Max Users
                                      16
Max digits
                                      14
Special disk format?
                                      Yes
Link to ASCII files?
                                      Yes,
                                           via programs
Fixed record structure
Amend record structure
                                      N/A
Link data files?
                                           via programs
Number sort fields
                                      N/A
Max number of keys
                                      limited by disk space
Max kev size
                                      127 bytes total for all keys
Data validation
                                      Good
Unique keys?
                                      Mandatory
Store calculated data
                                      Yes, via programs
Query facility
                                      No
Report generator
                                      No
Screen painter
                                      No
Screen manager
                                      No
                                      255 bytes
Max field length
Max record size
                                      limited by disk space
Editor
                                      Yes
File size fixed?
Data types
                                      No. but cannot exceed virtual volume
                                      N/A
Fixed length record stored?
                                      No
Number data files open
                                      limited by disk space
Totals & statistics
                                      No
Graphics
                                      Yes, via programs
Interaction methods
                                      Command line and menus
On-line help
                                      No
Tutorial
                                      Yes, manual
Reference manual
Reference card
                                      ***
Note+ maximum five stars possible.
```

Fig 3: Features and constraints

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to copy, print, delete, rename and perform global string substitution. Additionally, routine names can be listed and data can be packed for efficiency. The system shutdown is one of the utilities, thus to exit CCSM, the command is ZU <enter>, 11 <enter>. No wonder I didn't guess it!

Other utilities list all local variables, select I/O devices, edit device tables, perform cross-referencing, show system status, kill subtasks and verify system integrity.

CCSM can also keep a complete error log, which can be activated for different types of errors, listed and deleted.

Documentation

The main CCSM manual is broken into three sections. The first is an introduction to Mumps which discusses each feature in the context of its use, without getting too detailed.

The second section deals with the CCSM implementation of Mumps, discussing the various Z commands, the system variables, graphics, and so on. The third section covers native Mumps.

The overall result is terrible. Most of the manual seems to have been written by the programmer who implemented CCSM. It tends to include lengthy BNF syntax definitions, without actually telling you what use each particular feature is, or what other associated features exist. I found it was constantly necessary to switch between the three sections, none of which were cross-referenced, and only one of which was indexed.

Additionally, we were provided with a pocket guide, a 'cook book', and a Mumps introductory text. Each of these was equally bad.

MUMPS Toolkit

To aid system development using CCSM MUMPS, the Australian distributor has released a programmers tool box. This collection of utilities was originally developed by Patterson, Gray and Associates, and is licensed to Comp Computing, the authors of CCSM MUMPS.

Described as being "similar to SideKick, but far more advanced", the product isn't. Whereas SideKick is a memory resident 'hot-key' activated set of utilities for use within any software, the MUMPS Toolkit is a set of MUMPS programs which can only be used within

MUMPS, and are designed to assist the MUMPS programmer. Each of the utilities are invoked by command, rather than by 'hot-keys'.

A total of eight utilities are provided, ranging from the humble ASCII table display up to some truly useful ones. A pop-up calculator can be called from within any MUMPS program by a single command for on-the-fly computations, and the result of the last calculation is left in a MUMPS variable so that the application program can pick it up. As well as providing the basic five functions, the calculator can also perform trigonometric and advanced arithmetic operations.

A note pad facility is included which can also be called from anywhere by a single command. Notes are given names, as well as being date and time stamped, and may be rapidly browsed. In a multi-user environment, notes are collected by 'line number', which means that users of a particular terminal will only see notes created on that terminal. The note pad is a rather rough implementation: for example, the back space key is not recognised. Similarly, word wrap only occurs when initially creating a note — subsequent editing Goto page 113

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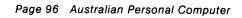
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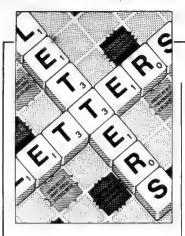
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Of mice and men

I was really surprised to find the mouse did so well in Dennis Freeman's test ('Man or Mouse?', APC, April) since the mouse had two paws tied behind its ears. One important defect in the article is that it set up a 'straw man'. Few would deny that keyboard operations are well adapted to word processing, and that it is hard for mouse-driven software to perform better than a keyboard system in trained hands. But even leaving this aside, the review had a number of problems.

One problem was that it did not distinguish the task of learning to use a mouse-driven word processor from the task of learning to use a mouse. The latter is a motor skill which, once mastered, can be applied to any application. Thus it took Dennis three hours 35 minutes to feel he could do anything he wanted, not just with Word, but with any other mouse-driven applica-

This is the chance to air your views — mail to 'Letters', Australian Personal Computer, 2nd floor, 215 Clarence Street, Sydney 2000. Please be as brief as possible and add 'not for publication' if your letter is to be kept private.

tion that might later come his way. By contrast, the three hours and six minutes it took him to learn the keyboard equivalents was time spent learning to use Word alone. Move to a spreadsheet or another word processor, and it would all have to be learned again (with the probability of confusion the next time he used Word, into the bargain).

The other problem was that Dennis insisted upon using the mouse in an almost completely 'dumb' fashion: that is, reaching for the mouse even when keyboard equivalents would have been quicker. The advantage of the mouse varies with different tasks. and a sophisticated mouser employs the keyboard for those things that it does best. Dennis was contrasting sophisticated keyboarding skills with those of a learning mouse user, which is no more fair than it would have been to use as his subject a 'hunt and peck' typist with no previous computing experience.

One advantage of mousedriven, pull-down menus, at least on the Mac (I cannot speak for the Apricot), is that each common command

is accompanied in the menu by its keyboard equivalent. This means that for the most part, you only use the mouse for positioning the pointer and highlighting pieces of text (which is what it does best), shifting it away from the text only on the first occasion that a command is invoked (which serves the dual function of invoking the command and reminding you what the keyboard equivalent was).

Which brings me to the principal advantage of mouse-driven software. Even those whose major computing activity is word processing do not necessarily use the same word processor every day: some take a holiday once in a while; some find themselves using a different word processor at work from the one they have at home. With a conventional system, these people have a frustrating time reminding themselves of the commands appropriate to a particular environment, and some seldom-used commands have to be looked up in a cumbersome manual each time they are employed never with a mouse. WIMP technology enables you to look through all the available

menus with a sweep of a mouse, and find the right command instantly.

This same feature makes learning a new software application simplicity itself. As long as you know what the application is supposed to be able to do, recourse to a manual is generally unnecessary. Therefore, the resistance to learning new techniques and improved facilities (which normally plagues everyone except the computer enthusiast on conventional machines) is rare in a mouse-driven environment.

We come back to my earlier point. The test was constructed on the assumption that learning to use Word would be a fair test of mouse technology, but this assumption is based on a pre-WIMP view of what is involved in learning a new application. A sophisticated 'mouser' would find that he already had most of the skills needed to employ Word, and would find his mouse-driven word processing at least a match for keyboard-based word processing. Note that I do not claim mouse technology to be superior for this application. It and programming are perhaps the only applica-

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LETTERS

tions which do not benefit greatly from mouse technology (though even these applications take less effort with a mouse, as Dennis pointed out). But try moving to spreadsheet, graphics, database, drafting, or music writing with a mouse, and compare the difference then! *M Franklin*

Yes... but wouldn't it be nice to have standard mice and WIMP conventions, not one-button two-button or three-button types with incompatible clicks?

Bad attitude

I put fingers to keyboard to express my disappointment in your magazine's apparent attitude towards the circumstances under which the MicroBee Gamma was released. Surely APC and YC don't indulge in such petty squabbling. Each magazine has enough merit to be bought every month, and they complement each other very well, providing the reader with not only news. reviews and such, but some insight into the theories on which modern computing is based.

Being a 'Bee owner, I may very well be biased, but I feel that both magazines should support to a reasonable extent, the products which emerge from Micro-Bee Systems. Without that company, the Australian personal computer industry would be one of minor assembly plants, and a magnet for foreign systems. My cynical point of the day, upon hearing about the huge sales (and targets for expanding these), which companies like Apple and Commodore make; why don't they use Australia for more than a sales dumping point? Perhaps some assembly or sub-contractor manufacturing; certainly some R & D. Without these inputs, their credibility must surely be devalued in the

eyes of the Australian PC user.

C Zymaris

Hypocricy

Regarding Noel Williams' February monologue concerning nonorganic life.

Mr Williams qualifications for an object being alive, though never stated, resolve into the following. He insists that life must be carbon based and that the object must be dedicated to supporting itself.

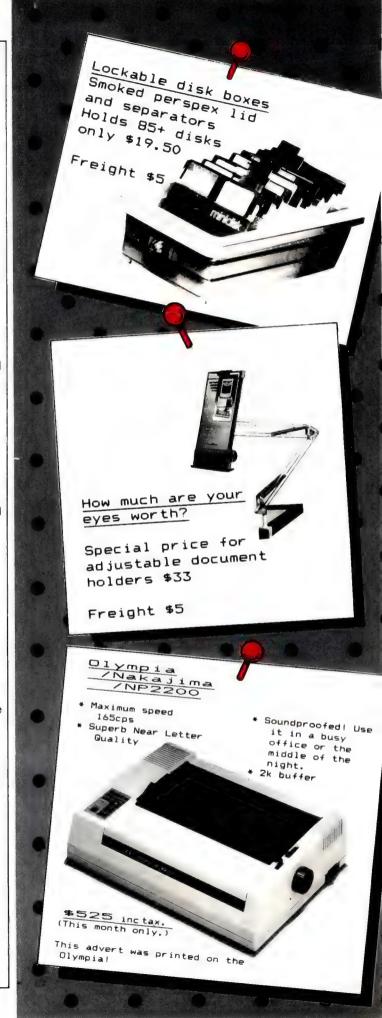
Why must life be carbon based? It is actually accepted that on a planet rich in flourine, an *organic* silicon/flourine system would be viable. The key word here is "organic".

Why must life be the sole dedication of all live creatures? People are not designed to "stop", but computers are generally required to be turned off and on occasionally. Is it a serious objection that they are functional when turned on again? Humans sleep, many animals hibernate, vet they are perfectly normal when they wake up! Given this, why can't the computer do something other than be alive, and then be returned to normal functioning as a live object.

Objections to simulations of life are simply Mr Williams insisting that all life shares an environment he finds convenient. And in discarding symbiotic systems from life he implies that his arm is not alive, for every cell would die were they to be separated from this body!

What are Mr Williams' qualifications? He indulges in all the contradiction and emotive wordplay of which he accuses Mr Simons. In the final count, he is afraid that nice naturally (divinely?) created life could be similar, let alone inferior to, designed and manufactured organisms.

A Fry





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Mac mix-up

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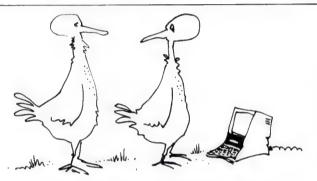
Exactly where the system broke down I am not certain. However, the information provided was believed to be accurate and available for publication (albeit by a few minutes) at the time I was discussing PC 86 and the

new Macintosh family with APC.

As it turned out, I was dealing with a hotch potch of US market information and draft local plans that did not take into account various timing differences in Macintosh Plus launch, or the availability of the Macintosh Plus keyboard on the Australian version of the Macintosh 512k/800.

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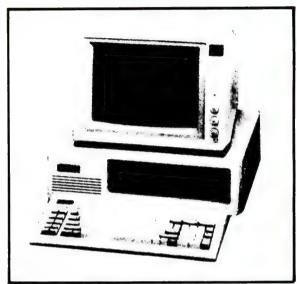
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Ideas processors such as Brainstorm and ThinkTank are no longer a new concept, but co-residency is. This impressive package sits in your micro's memory and is designed to enable you to achieve maximum efficiency.

Benjamin Woolley structures his thoughts.

The idea of an 'ideas' processor is seductive; what more useful application of a computer could there be than one that structures and arranges the jumble of ideas and half-thoughts that spill out of our minds every day? So, when Caxton launched Brainstorm (reviewed in APC, February 1984) there was, naturally, a good deal of excitement.

Meanwhile, in the States, a similar but separate line of development was being pursued. There it emerged as the 'outline' processor. Packages like Ashton-Tate's Framework and Living Videotext's ThinkTank offered 'outlining' as a means of structuring information, designed to help users to order and make sense of complex ideas.

Like Brainstorm, the assumption behind outline processors like Think-Tank is that ideas split up into a sort of hierarchical tree of headings and subheadings; a single trunk with many branches with many boughs with many twigs with many sprigs. The tree is then the totality of the outline.

An example outline for this article, compiled using ThinkTank, might be:

- + Intro
 - + Market
 - Brainstorm
 - Framework
 - --- ThinkTank
 - + Outline processors
 - + Theory
 - ThinkTank example
 - Tree structure
- + Ready!
 - Design

... and so on. The sub-headings are denoted by indents, and the 'level' of a heading by the number of indents. So, a sub-sub-heading would be indented twice. The plus sign indicates that a heading has sub-headings, the minus sign that it has none. In order to show the structure of the information, headings can be 'collapsed', so only the main heading is displayed; it's a useful way of taking out the fine detail in order to concentrate on the grand strategy, this being one of the principle benefits of outlining that distinguishes it from straight word processing.

Design

Ready! (the exclamation mark seems to be mandatory) is a co-resident version of ThinkTank; one that sits around in memory, on call to the user whenever needed. It can be loaded any time (usually when the system is booted up), and invoked from within an application program as well as at operating system level by pressing the 'hot key', which can be assigned by the user (the default is Ctrl-5). It will comfortably co-reside with other co-resident programs, SideKick, though some are fussy about their location, and will only work if they are loaded in after Ready!.

In the memory map, Ready! is sandwiched between the resident portion of DOS and the program area, taking up a minimum of 112k, allowing 16k for outlines. Outlines of up to 32k can be stored by extending the memory

available to 128k. In either case, you will probably need at least 256k of RAM to be able to exploit Ready!'s coresidency.

Give anyone who's used an outline processor a minute or two with Ready! and they'll see why co-residency is what outline processing has been waiting for. Being constantly within finger-tip reach, it's ideal for jotting down notes, or quickly preparing data for other applications, or shaping decisions (though saying it, or any sort of outline processor, is an aid to 'creative' thought is way over the top). At a fairly trivial level, it can be used as a diary and address book, or to compile do-lists; a daily summary of things to do. It includes an auto-dial facility, so you can run through a list of telephone numbers, calling them up with the press of a key. All you need is a Hayes or Hayes-compatible modem.

Ready!, however, is not simply a glorified jotter. It has a much bigger role to play. Its basic outlining system is identical to ThinkTank's. The trunk of the outline, to pursue the tree analogy, is the 'home' heading. As you would expect, there can only be one of these, which is normally used to describe the contents or purpose of the outline. The home heading is displayed at the top of the screen, and all the other headings are arranged beneath it. Entering other headings is simply a matter of pressing the 'Insert' key and typing them in. They are positioned with the cursor keys, being automatically treated as subheadings of the previous heading if they

SCREENTEST

are indented.

Once an outline has been constructed, it is equally easy to move through, edit and organise it. Moving between headings is done using the cursor keys: up and down to move between headings at the same level; and left and right to move between levels. To expand a heading — that is display its subheadings — you simply move to it and press the plus (+) key, and to contract it again, you press the minus (-) key.

To edit a headline, press 'E' and delete or insert text accordingly. To move a headline, type 'M' and use the cursor keys to reposition it; the heading moves with the cursor, so you can test moves out before fixing them. When you move a heading, all its sub-headings follow. Headings can be deleted, copied, 'hoisted' (moving them to the top and blanking out the rest of the outline), alphabetically sorted (in ascending and order), searched descending keywords, in other words played around with in a host of different ways.

These instructions are performed either by using the cursor keys to select from a menu (invoked by pressing the F10 function key, and displayed in a five-line message area at the bottom of the screen) or with a single keystroke. Even better, Ready! will support a MicroSoft mouse, allowing the user to shoot the cursor around the outline as fast as a pin-ball.

So far, Ready! is more or less the same as ThinkTank, and in important respects superior to Brainstorm, because you can display headings at all levels at once, whereas Brainstorm will only display one level at a time, making it more difficult to manipulate the outline and get a general idea of its shape.

Here, however, Ready! starts to detach from its parent product. Firstly, some facilities have been taken out, so it takes up less space in memory. Unlike ThinkTank, outlines can't be paged to disk; each one can only be as big as the

memory available — up to 32k (ThinkTank outlines can be as big as four megabytes, depending on available disk space). This maximum can't be increased, even though IBM PC/ATs and compatibles will increasingly be packed with megabytes of memory. Nevertheless, 32k is adequate for the sorts of purposes Ready! should be put to; it's enough for several hundred headings.

Again to cut down on the memory it Ready! does needs, not have ThinkTank's document mode, which means that free-form text can't be attached to headings. Like Brainstorm, Ready! wraps words round to a new. automatically inserted heading if the line-width is exceeded. However, this raises problems, as the new heading is at the same level as the heading in which the text starts. This means the block of text can be arbitrarily split if you start to play around with the outline.

Ready! also lacks any facility for linking between headings. In both ThinkTank and Brainstorm, the same headings at different levels can be linked together (they're called 'clones' in ThinkTank), which is useful for generating outlines that aren't purely hierarchical.

Living Videotext has obviously put some hard thought into exploiting the benefits of co-residency. Replacing some of the more memory-greedy facilities of ThinkTank is an array of features that give it a purpose all of its own. The user-chummy author of the manual, one Adam Green (I'll be your guide to the wonderful world of Ready!, he writes at the start of the manual), says that he uses Ready! as a briefcase, and ThinkTank as a filing cabinet. If anything, that's underselling it (or overselling ThinkTank); Ready! is suitable for a completely different kind of work to ThinkTank; what might be called, to borrow an old DP term, data-prep.

As well as being able to move from Ready! to an application by flicking the hot key, outlines can be transferred (using the transfer key, default: Shift-Ctrl-5). On its own, this would be useful for inserting an outline into a word-processed document, but not much else. However, there's more to it than that. Ready! can transfer keystrokes as well as straight text. By including key words, or 'macros', set in curly brackets, an outline can actually control the application it's being transferred to.

For example, suppose you had a list of numbers jotted down in an outline that you wanted to transfer to a spreadsheet, you could include within the appropriate heading a series of keystrokes such as (Home), (Right Arrow), (Down Arrow) (the latter can be abbreviated to (Ra) and (Da)) to move the cursor in the spreadsheet to the required cell when the transfer is made.

The function of every key on the IBM PC and AT keyboard can be reproduced this way, including combinations such as (Alt, A), (Ctrl F1) and (Shift Prt Sc). You can also repeat a series of keystrokes by placing a number after the macro, as in (Right 10) to reproduce pressing the right arrow key 10 times.

In short, you can get the outline being transferred to pipe keyboard commands into the target application automatically. There's also a selection of macros to control the transfer itself, (Fast), (Slow) and (Very slow) ensure that it's done at a speed the application can cope with (300, 18 and nine character per second respectively). (Pause) stops the transfer, passing control to the keyboard, and (Delay >seconds<) will delay it for a specified number of seconds, or until a key is pressed. There are also special macros for Framework, which includes keystrokes that DOS won't recognise, and one for Sidekick, to invoke it from within an outline. The transfer is done from within the target application, rather than Ready!.

In order to tailor Ready! to particular applications, a number of 'Set-up' options are available. These link a

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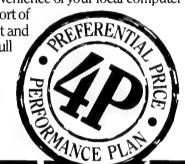
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particular set of macros to an outline, to ensure that the transfer suits the target application. The Set-up parameters of the target application program are attached to an outline by selecting its name from the Set-up menu. These parameters are stored in a configuration file, which can be edited like any other outline (very neat and consistent; a sign of sound software design). The parameters allow macros to be sent at a particular time in the transfer: when it starts, at the beginning of each heading, every time a new level is entered, and so on. A set of 30 pre-written Set-up parameters for all the major software packages is supplied, which can be added to or edited as necessary. The only omission, which is an irritating one, is a facility to send particular macros when particular levels of an outline are transferred.

Not every circumstance in every application can be covered by using macros.

The configuration file also holds parameters for using Ready! itself; for specifying the hardware configuration, assigning the hot key, and setting preferences such as the time and date formats (you can enter a time and date stamp in an outline simply by pressing Alt-T and Alt-D respectively). All this makes the program flexible and, because the configuration is an outline like any other outline, easy to adapt.

Documentation

The documentation is concise and clear,

if a little effusive at times. It contains a tutorial (entitled A Day in the Life of Ready!), and a comprehensive reference section. Example applications are given, and appendices contain clear guidelines on configurations. The examples are rather light-weight (for example, it shows you how to use Ready! to plan a holiday), and fail to demonstrate the package's real benefits. The manual hasn't been anglicised, but that seems to be standard practice.

Price

Ready! retails for approximately \$125 and is available from leading computer suppliers. This is a reasonable, even generous, price for a sophisticated product.

Conclusion

It's hard to set the limits of Ready!'s use: new possibilities emerge almost all the time. Nevertheless, for someone who throws a lot of data at their computer during the day, and who has to collate and organise complex or unstructured thoughts and notes, the benefits would soon emerge. Its co-residency is a real asset, and for most users it is likely to prove of greater practical use than ThinkTank as a result.

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subscript characters Characters per line Ordinary (pica/elite) 80/96

Double width elongated (pica/elite) 40/48 Compressed (pica/elite) 132/158
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Dot configuration:

Dot alignment

(Hor. x Ver.) Dot pitch (Hor.) (Ver.)

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¹/₁₂₀" (0.21 mm) ¹/₇₂" (0.35 mm)

1/160" (0.16 mm)
1/144" (0.18 mm)

Ordinary characters: Superscript/subscript characters:

0.078(W) x 0.095(H) in. (1.99 x 2.42 mm) 0.078(W) x 0.053(H) in. (1.99 x 1.36 mm)

per of characters pe

line (per inch (25.4 mm)): Pica (Draft, NLQ) Elite (Draft, NLQ)

Compressed Pica elongated Elite elongated Compressed elongated Draft-Pica

80 cpl (10 cpi) 96 cpl (12 cpi) 137 pcl (17 cpi) 40 cpl (5 cpi) 48 cpl (6 cpi) 68 cpl (8.5 cpi) 180 cps 180 cps

Printing direction:

New line time:

Paper used:

Printing speed:

Draft-Elite 180 cps
Near Letter Quality 33 cps
Text printing: Bi-directional Single direction (left to right)
Approx. 100 msec (with 1/6 inch (4.2 mm) line feeding)
Tractor feed (with fanfold paper)
Friction feed (with single sheet)
Fanfold paper Width: 4-10 inches (102-254 mm)
Thickness (paper weight in kg): 34-55 kg
Single sheet Width: 4-9 inches (102-299 mm)
Height: 5-14.3 inches (127-363 mm)
Thickness (paper weight in kg): 34-70 kg
(only 1 sheet)
1/100 in (0.25 mm) maximum
Original and two copies

Paper thickness:

Head service life:

Original and two copies -4°F (-20°C) to 140°F (60°C) temperature, 10-90% humidity 41°F (5°C) to 104°F (40°C) temperature, 20-80%

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RD READ "NAME: ", NAM, ! QUIT: NAM=""

IF NAM'?2.Al", "1A.E WRITE "PLEASE ENTER AS LAST, FIRST MI", ! GO RD

TEL READ "TEL # ", TEL, ! IF TEL'?3N1"—"4N WRITE "NNN—NNNN PLEASE", ! GO TEL

SET :DATA(NAM) = TEL GO RD

PRT WRITE "NAME", ?20, "TELEPHONE #", ! SET NAM=""

LP SET NAM=\$ORDER(:DATA(NAM)) QUIT: NAM=""WRITE NAM, ?20, :DATA(NAM), ! GO LP

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SCREENTEST

Continued from page 96

does not reform paragraphs, nor is it possible to insert more characters into a line than there are spaces remaining at the end of the line. To crash the note pad, simply select the SETUP function and don't alter any of the parameters.

On to the more useful features. A menu generator is provided to assist the application builder. This utility allows multiple menus to be built and linked together, including security. Menus are executed using a single command, and cause other MUMPS programs to run depending on the user's selection. Menu items are selected either by using the cursor keys, space bar, or entering a short identifier. Additionally, a special programmer access code' can be specified which allows the menus to be broken out of.

In addition to the main menu manager, pop-up menus are also provided. These allow small windows to appear anywhere on the screen containing either messages or menus. Various highlighting and border options are supported. This feature is extremely easy to use, and incredibly powerful, but unlike other pop-up menu managers, does not restore the screen contents overlayed by the menu, resulting in clobbered displays unless the programmer designs his menus verv carefully or takes responsibility for restoring the screen contents.

A screen painter is also provided which allows the programmer to interactively draw screens for later use. While not feature rich, the painter provides all the elementary functionality required, including four direction cursor movement and video attributes. Additionally, pressing the TAB key invokes a 'line mode' which allows the drawing of boxes and the like. This mode is really quite flakey, producing spurious characters on the screen, destroying other parts of the screen, and missing pieces of lines. It's a really neat idea — it

even does the corners properly — it just doesn't seem to be entirely bug free yet. Finished screens are compiled into a MUMPS program, a procedure which takes a minute or so.

While the finished screen runs extremely quickly, the painter itself runs like a lame dog. To be fair, MUMPS was being run on a floppy based M24, and the incessant grinding of the disks did nothing to enhance the speed. Most users would run on a hard disk, and so the fits and starts would be greatly reduced.

Most screen painters allow the definition of input fields. In the MUMPS tool kit, this is done by a separate utility. Once a screen has been displayed, the program must make a series of calls to the final utility, TKREAD. This utility allows input to be taken from any set of screen co-ordinates, and includes features such as allowable character lists, maximum and minimum values, pattern validation, overtype editing of initial values, prompt text, terminators and maximum lengths. Upon return, TKREAD can tell the program which key was used to terminate the input, such as enter, up arrow, tab, and so on.

The screen painter and the input routine provide all the functionality required to produce full data entry screens. Unfortunately, in a very unweildy fashion. The two really don't fit together at all. The painter allows screens to be designed simply by running the cursor around the screen, yet to obtain data, absolute co-ordinates must be known and the programmer must manage the movement from field to field.

Despite its obvious shortcomings, the tool kit is a must for the serious MUMPS programmer. The licence agreement does not spell out arrangements for the use of tool kit generated software in packed systems. However, for \$100, the tool kit can save mountains of time.

Conclusion

Mumps shows an interesting approach to implementing an integrated DBMS language. I believe the idea of removing any distinction between database operations and normal variable operations is a real winner.

However, Mumps itself is not very easy to use. It is not an end-user tool. It is not a fourth generation language. It is not commercially viable due to its many commissions.

Notwithstanding, it takes an excellent approach to multi-tasking and multi-user under MS-DOS. Although building a system in Mumps would be far more difficult than in any of the other DBMS systems around today, Mumps is virtually the only one which would yield a true multi-user system — and would probably do it at the lowest hardware and software costs.

Mumps is available from MGlobal Australia, 261 George Street, Sydney. Telephone (02) 232 1732.

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Kester Cranswick has been studying the list of exhibitors for the forthcoming PC86 Show at Melbourne's Exhibition Buildings. Here he presents his findings in APC's traditional Show preview.

Put on your most comfortable shoes, fatten up your wallet, leave the dishes in the sink and get on down to Melbourne's Royal Exhibition Buildings between June 1 and 4. There you will find the old, the new, the borrowed and Big Blue, showing off their goodies to ordinary folk like you and I.

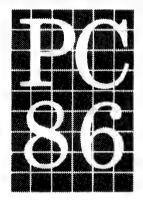
That's the venue for (deep breath) the Seventh Australian Personal Computer Show, (PC86), Office Technology 86, Communications 86 and the Learning Show. It's also where the annual '86 PC Awards will be announced, and presented by the guru of Silicon Valley himself, Regis McKenna.

Some 150 companies will be represented, including IBM, Apple, Canon, Barson Computers, Commodore, Arcom Pacific, Imagineering, Olivetti, Telecom, Epson and Ericsson. The organisers expect in excess of 30,000 visitors.

Not every stand will have headline grabbing new products. For some, the Show is simply an opportunity to put on a public face and hopefully generate plenty of sales leads. For others, it is the chance to launch products in a venue where they can be guaranteed exposure and a large audience. But, with all the new

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products being launched, the competition for 'most talked about product' is fierce.

What to look for

Commodore is going to give it its best shot. It will be showing the already well known Amiga — the answer to the Macintosh. It will have professional musicians using the Amiga to generate some sort of melody above the chaotic noises of the Show, video camera digitizing visitors and cartoonists, artists and graphic designers trying to use the Amiga graphics to good effect.

But the real interest will be in the Amiga PC-emulator. This device will let the Amiga run PC software, and should answer any criticisms about a shortage of applications. Mind you, it is rather like using a Formula One racing car to commute.

Not to be outdone, Mobex is using the occasion to launch Atari back into Australia. In what will probably be the star attraction of the show, the Atari 1040ST will be making its debut.

For the uninitiated, the 1040ST is a machine with 1Mb of RAM, a 170k ROM, an internal double-sided, 3½inch 1Mb disk drive, a mouse and Basic, Logo, Gem and the TOS operating system. The cpu is a Motorola 68000 running at 8Mhz. The 1040ST has a high resolution PAL monitor, 14" colour with up to 16 colours, or 12"



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PREVIEW

mono, with RF and composite video output too. There is a Midi interface plus word processing and graphics

What will stun the opposition, without a doubt, is the price. All that comes for \$2,195 (mono), or \$2,495 (colour). That is around \$1,000 less than the originally anticipated price. The Amiga/Atari battle is on in earnest.

Mobex is also hoping to have a PCemulator board for the 1040ST on show too. It will be interfacing the device to Casio synthesizers, via the Midi port, and will be showing about 100 software packages. It will also have a compact disk ROM device, with the Grollier encyclopedia on one CD.

There's more from Atari too. The junior version of the 1040ST will be on display. Called the 520ST, it has 500k of RAM, an external 500k disk and a price of \$1,695. And there will be the home-orientated 130XE, on show for the first time. It has been lying dormant in the Atari catalogue for months, and comes in at \$499. The 130XE boasts 128k of RAM and a 6502 processor. Well, it is a bit better

than the VCS2600 games machine.

Yet another non-PC will be emulating the IBM micro. Gametronics will have a prototype card for the BBC Master that contains an 8086 processor, 512k of RAM and runs PC-DOS, MS-DOS and CP/M-86. It might just get the BBC out of the classroom.

If you think you are better off sticking with PCs that don't pretend to

'Multidos enables up to six dumb terminals to be slaved off a single PC.'

be other things, there are at least a dozen new clones to look at.

Barson Computers will be showing the five Tandon micros. The range consists of two PC/AT compatibles, with either a 20Mb or 30Mb hard disk, and three XT compatibles, with a choice of 10Mb, 20Mb hard disk or twin 51/4 inch, 360k floppies.

Assco will have five new clones on show, with the brand name Ergo. Made in Hong Kong, the range is two



Regis McKenna, in Australia to present the '86 PC Awards. among other things.

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- Informix compatible

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- 0 1,000 rows x 1,000 columns
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- Optional single key commands

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raphics

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enu system

- Integrate spreadsheet
- Integrate database
- Point and pick option selection
- O Pass a filename to a Unix command
- O Remark in menu
- Fetch user data for command
- O Run a Unix command
- O Define a user prompt
- O Restructured menu layout
- Multi-columning
- Concatenate options
- Softkeys
- Boxing
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- Document folios
- Multi-level menu structure
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- O Compiler syntax checker
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PREVIEW

AT compatibles (Macro-AT and Super AT) and three XT compatibles (Macro-88, Turbo and Super-Turbo). Their best feature is a competitive price.

Epson is launching its AT compatible, the PC+. Priced at under \$5,000, it has a new NEC 8086 cpu, dubbed the V30, switchable clock speed (4.77 or 7.16Mhz), 640k of RAM, auto power on and off, five expansion slots, serial and parallel ports and colour or mono graphics. It comes with Basic and MS-DOS.

MicroBee will be revealing at least two PC and PC/AT clones, with a graphics-based user interface.

Finally, in the PC field, there will be two new laptops. From Chendai, the Lap has a backlit LCD display which uses new LCD technology to give it a bigger contrast range and a wider viewing angle. It is AT compatible and comes with a choice of either two 5½ inch floppy disks or, believe it or not, a single 5½ inch disk and a 20Mb hard disk. The cpu is an Intel 80186 and there is 640k of RAM.

For the budget conscious, the Pulsar laptop, from Pulsar Electronics, is a PC-compatible with 512k of RAM, a single 3½inch disk drive, backlit LCD display and a carry case for less than \$2,000.

Add-ons

There will be peripherals aplenty for the PC market too. Perhaps the most interesting development is the arrival in Australia of hard disks on cards. Barson Computers has a 21 Mb hard disk that fits an expansion slot of a PC or compatible. Called the Business Card 21, it is made by Tandon, and will sell for less than \$2000, including an on-board disk controller.

Imagineering has the Mountain 20Mb hard disk Drivecard and Adaptive Electronics has another 20Mb hard disk card under the Tandon brand name. With Barson distributing Tandon micros, and Adaptive, Tandon hard disks, it gets a little confusing.

Gametronics will be launching a speed card for the PC/XT, an 8Mhz card that doubles the processor speed. It will also have a 132 column display card for the PC/XT.

Alpha Technologies is showing, for the first time, Multidos, a hard disk device which enables up to six dumb terminals to be slaved off a single PC. It is Australian made and supports both MS-DOS and CP/M. A new mouse for the PC will be unveiled by Arcom Pacific. Called the Telepaint/Manager Mouse, it can work on a

vertical surface and can be configured with macros for the buttons.

Canon will be demonstrating an optical character recognition device for its A200 and A300 micros, while Imagineering will have a short modem card for the PC that is smart and has all popular baud rates. Another new modem will be launched by Pulsar Electronics. It is intelligent too, with 300, 1200 and 1200/75 baud rates, dial back security and an attractive price of \$750 all in.

Macintosh owners might be feeling a little left out at this stage. Fear not — Symbiotic Computer Systems will be launching the 20Mb Hyperdrive 2000, with a price of around \$6,000, the Accelerator Card, a co-processor for up to 12 times faster number crunching, and a fan-aided surge suppressor with

the unforgettable name of Fanny Mac.

New monitors from Taxan and Eizo will be showing their colours. The Taxan releases are the colour high resolution Super Vision IV and medium resolution IVM, KX-1222 Green and KX-1223 Amber. Taxan also has two new colour graphics cards, one short and one with an 8k second character set option, and a CD ROM drive, the DRD 530, which sits in a PC. It has 560Mb of ROM and an average seek time of 0.3 seconds.

And the soft side

Life is not all about hardware though. There will be new software to see. From Arcom Pacific, there will be a crowd stopper for the intelligentsia called Turbo Prolog. This is an artificial

PCTFX TYPESETTING PROGRAM

FOR IBM PCs AND COMPATIBLES

What is TEX?

TEX is a comprehensive typesetting program which has been running on mainframe computers since 1978. It is now available from THE WORDWORKS to run on the IBM PC, PC-compatibles and other MS DOS machines. (Incidentally, TEX is pronounced 'teck'. That's because the 'X' is really the Greek letter chi.)

What Kind of Typesetting Can TEX do?

Anything from complex scientific textbooks $(\int_1^x \frac{dt}{t} = \ln x)$ to wedding announcements to multi-column newspaper layouts.

What Hardware Is Required to Run TEX?

An IBM PC or compatible with a 10 (a squeeze!) or 20 megabyte hard disk and 512K or (preferably) 640K of RAM. THE WORDWORKS will happily supply these items.

What Kind of Printers Does TEX Support?

It gives true typesetting quality on the IMPACT 800-II LASER PRINTER, or on a Hewlett-Packard Laserjet printer upgraded with an IMPACT board from THE WORD-WORKS. (This ad was typeset with TEX and an IMPACT LASER PRINTER.)

It gives quite good (e.g., club newsletter) quality output on the TOSHIBA 1340 & 1351 24-pin dot matrix printers; and does a reasonable job with Epson MX/FX or compatible printers. However, with matrix printers character-borders are faintly 'dotty'.

Is TEX Hard to Learn?

Learning the functional basics of TEX is no harder than learning a good word processing program. Beyond that you can go as complex as you like—TEX is a very powerful and versatile tool.

Is TEX a Word Processing Program?

No. You use a normal word processing program for preparing your text; then you convert your text files into standard ASCII files (most good wp programs allow you to do this easily); after which you process these ASCII files with the TEX program, and get a DVI (i.e., Device Independent) file. Finally you send this DVI file to your printer. (TEX files can be transferred between mainframe computers and PCs for editing or printing.)

Can One View One's TeX Output on Screen As It Will Appear on Paper? Yes, with the optional PREVIEW program—provided you have a Hercules graphics card or equivalent and a 720x400 pixel monitor. THE WORDWORKS can provide these.

PCTFX \$450

Printer Drivers: Epson FX/RX \$175; Epson LQ1500 \$175; Toshiba 1340/1351 \$175; Impact Laser 800 Printer—POA.

¹By the way, TpX does automatic footnotes, indexes and tables of contents.

THE WORDWORKS, The Boulevard Lawns, City Walk, Camberra City. ACT. 2601. Telephone (062) 572893; (062) 477739.

PREVIEW

intelligence language for the PC. Arcom Pacific will also have Supercalc 3a, as Supercalc, but for the Apple, and SuperProject Plus, an improved version of SuperProject with the ability to schedule with limiting resources.

The other software giant, Imagineering, will be releasing Harvard Presentation Graphics, a package with 17 fonts, 16 colours and able to generate 35mm slides, overhead transparencies and the like; Report Writer; a Lotus accessory; and ChartStar, from the WordStar family. SCA will be demonstrating the PC version of Page Maker, called Personal Publisher. Now PC owners can generate their own advertising flyers and magazines, in the privacy of their own room.

Integrity Business Software is launching Breakaway, a software product which provides data transfer between the IBS accounting products and rival packages; and Manufacturing, an integrated manufacturing system for the PC with job costing, bill of materials, work in progress and inventory modules in the one system.

PCExpress is the name of a fabulous, but expensive, multi-dimensional, relational database from Iraus. It

would be shorter to say what it can't do, but it is intended to act as a decision support system, with analysis, report writing, graphic, mathematic and statistical features. It also allows data to be transferred to and from packages such as Lotus, and the PC to act as a mainframe terminal. The only drawback is the \$3,000 price tag.

Other than PCs

Strolling over to the Communications 86 section of the exhibition will give you access to yet more new products, all in the data communications field.

Australian Tel-Tec will be demonstrating the QDF Distribution Frame Block, a device that quickly connects telephone exchange and PABX applications. It will also have a fibre optic distribution panel, for connecting internal and external fibre optic links.

Motorola Communications will have a high tech gadget on show for the first time. It is the Syntrx, a third generation, synthesized mobile radio. It has been awarded an Australian Design Award, so it looks and sounds good.

Facsimile is a key component of

communications, and NEC Australia will be unveiling two new facsimile machines. The Nefax-D35 is the first Group 4 facsimile device in Australia, and transmits an A4 document in three seconds. Group Four means that it can be integrated to normal digital data transmission networks. NEC will also have the portable Nefax-11 on show.

PABX is something many companies are now installing, and Communications 86 will have its crop of new devices. Plessey Communications Systems will be demonstrating its ISDX digital telephone system and ISDT digital telephone, while the Telephone Supply Company will have two new Philips PABX telephones.

The last part of the exhibition is Office Technology 86. Here the visitor can find photocopiers, typewriters, facsimile machines and workstations.

Two similar products that are quite unusual will be launched by Canon and Copispec. The Canon Electronic White Board and Copispec TEC Meeting Board are both large drawing boards which have the ability to transmit what is drawn on them digitally to another board, or a PC. A board of information can be stored to disk, or sent to a

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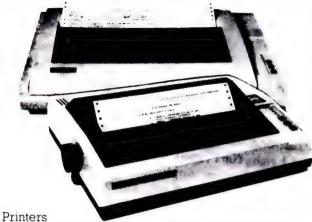




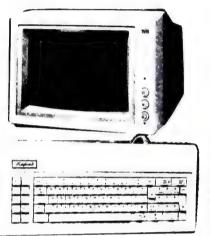
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Bidirectional printing logic-seeking programmable CPA 80 clmn 100cps - \$397.50; CPB 80 clmn 130cps - \$397.50; CPB 136 clmn, 130cps - \$797.50



IBM & Apple compatible FDD (Shinon, Teac or Sanyo), 80 trac d/s d/d \$235; 40 trac s/s s/d \$220; HDD 5¼ (NEC, Teac) 10Mb \$840; 20Mb \$1120; 40Mb \$1900; HDD controller DTC5150BX \$340

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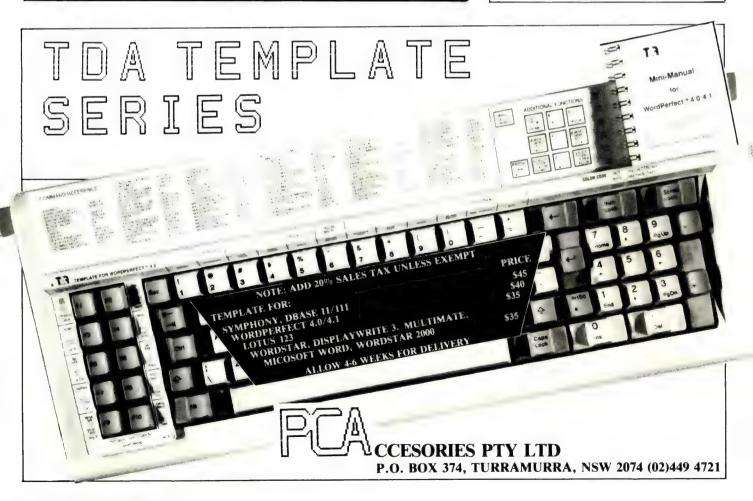


remote location.

A new laser printer, the Opus 2, will be on show at the Ectron stand. It prints eight pages per minute and has a 300 x 300 dot per square inch resolution. You'll probably hear the other Ectron new release, a series of digitized voice systems. The Delta Maxi 10 gives up to 10 minutes of speech in ROM or RAM. Speech can be customised for particular requirements.

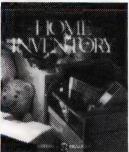
Datamaster is a micro device which gathers and processes data about employee attendance times and job costing. The agents, Creswick Industries, see it eliminating the manual time clocks and manual records.

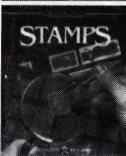
They had better not rig it up to the turnstyles: it would probably get overloaded. Despite the huge number of shows, all offering opportunities for new product launches, PC86 is going to have the best range of new products to capture the attention of END the visitor.

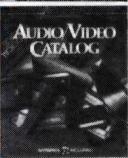


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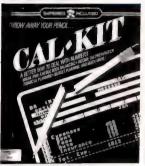








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Come out of your shell

If you consider yourself to be an expert on a particular subject, why not give others the benefit of your knowledge by creating an expert system? Sergio Vaghi presents an example of DOS as an expert system shell which contains many useful characteristics.

Many specialised domains of knowledge (can be represented in the form of structured decision trees such as the one shown in Fig 1. Examples vary from the expert knowledge needed for the classification or identification of objects, from plants and animals to certain types of medical consultations, from fault diagnosis in complex machines to investment advice, and from simple games to the selection of mathematical routines from a software library. Treestructured expert knowledge can then be used as the basis of an expert system (ES) (see also 'Playing by the rules' by Ed Stenson, APC, November 1985 for a method to build decision trees).

If you plan to develop an expert system of this type, or simply wish to gain experience in this area of artificial intelligence (AI), this article will help

When you have organised the expert knowledge, you are confronted with the problem of translating it into computerised form. Two main alternatives currently exist: coding the knowledge base in an Al language such as Lisp or Prolog (although in certain cases a procedural language can also be suitable); or using a generic mechanism of inference, a so-called expert system shell. The first approach requires, of course, that you know the language in question. Learning it may or may not be worth the effort, depending on your application and on whether you intend to write many expert systems in future.

Expert system shells are programs which are commercially available and can be used in different ES applications, provided that the knowledge base is coded with a structure and syntax understandable by the shell. Structure and syntax are kept very simple, so that

even someone with no programming experience can easily write the code.

Shells can be written in high-level languages such as Pascal and Fortran, or even in Basic; their prices range from less than \$100 to well above \$2000.

Strategy

- s0 (No suitable
 - strategy available)
- s1 Call purchase
- s2 Synthetic long stock
- s3 Bull spread
- s4 Protected stock purchase
- s5 Bullish call calendar spread
- s6 Covered call writing
- s7 Uncovered put writing

Table 1 Option strategies (subset)

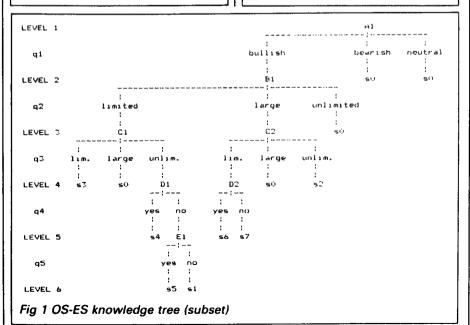
The source code is not always included and you will use the shell as a black box attached to your knowledge base — a rather unsatisfactory situation.

If you use a PC running under PC-DOS/MS-DOS (DOS for short), version

Questions

- q1 Are you bullish, bearish or neutral on the stock?
- q2 Risk you are ready to take (limited/large/unlimited)?
- q3 What is the reward you are after (limited/large/unlimited)?
- q4 Do you prefer a position including the stock (yes/no)?
- q5 Do you prefer to take a spread position (yes/no)?

Table 2 List of questions (subset)



) OFF		REM REM
		REM
	start.bat	:01
		ECMO Are you bullish, bearish or neutral on the stock ? >> facts ECMO Are you bullish, bearish or neutral on the stock ?
HO	OPTION STRATEGIES - EXPERT SYSTEM	ppp
HO	ver. 0.00 (subset)	REM
HO .	Copyright 1986 by S.Vaghi	:q2
CHO .	copyright 1700 by 5. vagni	ECHO Risk you are ready to take (limited/large/unlimited) ? >> facts
AUSE		ECHO Risk you are ready to take (limited/large/unlimited) ?
EXIST facts	s DEL facts	REM PDD
י מ		:93
EH		ECHO What is the reward you are after (limited/large/unlimited) ? >> facts
CHO OFF		ECHO What is the remard you are after (limited/large/unlimited) ?
L5		ppp
		REM :q4
EM	kb.bat	ECHO Do you prefer a position including the stock (yes/no) ? >> facts
EM Em		ECHO Do you prefer a position including the stock (yes/no) ?
EM		PPP
EM	RULES	REM
EM	10000 to	:q5
EM		ECHO Do you prefer to take a spread position (yes/no) ? >> facts
EH lev	el 1	ECHO Do you prefer to take a spread position (yes/no) ?
EM		PPP REM
ai 15 71	bullish COTO bi	REH
	.== bullish SOTO bl .== bearish GOTO sO	REM
	== neutral 6070 s0	REM
	20 221 ? > \$.bat	REM
6010	ql	REM
EM		REM SOLUTIONS
EMleve	1 2	REM SOLUTIONS
EĦ		REM
bl te	72 == limited 6070 c1	REM
	12 == large 60TO c2	REM
	12 == unlimited 60TO s0	:s0
	CHO 40 %1 %%1 7 > \$.bat	rec (NO_SUITABLE_STRATEGY_AVAILABLE)
	OTO q2	REM
EM		:51
EM lev	rel 3	rec CALL_PURCHASE
EM		152
c1	15 97 1A-4 CBYO -7	rec SYNTHETIC_LONG_STOCK
	IF %3 == limited 60TO s3 IF %3 == large 60TO s0	REM
	IF I3 == unlimited GOTO di	:93
	ECHO TO 11 12 171 ? > \$.bat	rec BULL_SPREAD
	60TO q3	REM :s4
REM		rec PROTECTED_STOCK_PURCHASE
c2	IF %3 == limited 60TO d2	REM
	IF X3 == large 60TO s0	:55
	IF X3 == unlimited GOTO s2	rec BULLISH_CALL_CALENDAR_SPREAD
	ECHO 20 21 22 221 ? > \$.bat	REN
	6DTO q3	156
EM		rec COVERED_CALL_MRITING REM
REMlev	el 4	rcn :s7
REM		rec UNCOVERED_PUT_MRITE
:d1	15 74 ee van COTO -4	REM
	IF 14 == yes 6070 s4 IF 14 == no 6070 e1	REM
	ECHO XO X1 X2 X3 XX1 ? , \$.bat	REM
	SOTO 44	
REM		
:d2		ECHO OFF
	1F 14 == yes 6070 s6	PROMPT \$6
	IF 24 == no 60TO s7	REM
	ECHO XO X1 X2 X3 XX1 7 > \$.bat	REM
REM	60T0 q4	XEN
KEMlev	el S	
REM	•• •	
:e1		
	1F 15 == yes 6010 s5	
	1F 15 == no 6010 st	
	ECHO ZO Z1 Z2 Z3 Z4 ZZ1 ? > \$.bat	ECHO OFF
REM	60TO q5	CLS
		REM
		REM bullish.bat, bearish.bat, neutral.bat, limited.bat, large.bat,
REM		REM unlimited.bat, yes.bat, no.bat
REM		I NEU
REM Rem		FCHO TO >> facts
REM	QUESTIONS	ECHD 10)) facts

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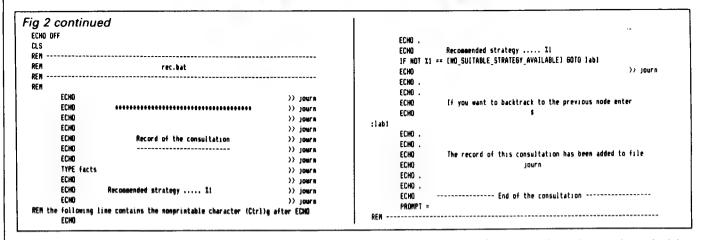
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PROGRAMMING



2.00 or later, you perhaps have a better alternative — using DOS itself as an expert system shell. It will be shown in this article that DOS can be used as an inference engine for expert systems based on deterministic, tree-structured knowledge, not directly involving numerical calculations. All you have to do is write the knowledge base using the simple syntax of the DOS batch files, which essentially amounts to the most direct form of structured English. It's simpler than Basic, and it comes 'bundled' with your machine.

DOS as an ES shell

The minimum that is required from an ES shell is the ability to perform conditional testing (of the type IF...THEN...), branching (of the type GOTO...), and input/output management suitable for interactive use of the program.

In DOS, conditional testing is provided by the batch sub-command IF [NOT] condition command, where the condition parameter is one of the following:

ERRORLEVEL number string 1 = string 2 EXIST filespec

and command is any DOS command. NOT condition is true if condition is false.

Branching is performed by the GOTO label sub-command, which causes commands to be executed beginning with the line immediately following :label.

I/O management is rather more complex, if interactive use is desired. Output can easily be obtained by the subcommand ECHO [ON:OFF message]. ECHO message displays the string message onscreen and can thus serve for communication with the user. ECHO OFF inhibits screen display of the commands following it in the batch file, and can be used to avoid displaying useless messages onscreen.

Interactive input to a batch file

requires, on the contrary, a programming trick, as the usual way to provide input to a DOS batch file is to pass the values of the replaceable parameters when the file is called. Dummy parameters — represented by the symbols %1 to %9 in the code — are replaced, at execution time, by the actual parameters which follow the name of the file when called. DOS does not offer the feature, present in the more powerful operating systems of minis and mainframes, of allowing the user to be prompted — during execution — for a missing parameter.

How this problem can be solved will be explained when I present an example of an expert system.

Other features of DOS used in the example are:

the aforementioned possibility of transferring parameters to a batch file;
 I/O redirection with the TYPE command and ECHO sub-command, to direct text and messages to a file; and
 the DOS commands CLS, to clear the screen, and PROMPT, to change the prompt, which, with the PAUSE and REM sub-commands, will help in adding a cosmetic touch to the expert system.

Only a small number of internal DOS commands and batch sub-commands are needed in our example. All the other DOS commands can, however, be used and may prove helpful in certain applications.

Desirable features

An expert system should, first of all, be easy to write and maintain. I personally find Lisp and Prolog programs often hard to read, which also means they're difficult to debug and maintain, because errors can easily slip into the code and go undetected. A friendly interface with the user is also desirable. Interactive use is generally required, with reasonably efficient error-trapping for the less experienced or occasional user. A 'help' facility can be useful.

Backtracking — that is, the possibility

of going back to the previous decision node — is also important as it allows the user who has reached the end of a limb to go one step back and choose a different path, without having to start the consultation from the beginning.

Another essential feature is the possibility of tracing and recording a consultation. This is invaluable during debugging of the program, and convenient for the user, who gets a complete record of the session.

Easy access to a database directly from the ES — for example, to provide a detailed description of a given recommendation — can also be handy in certain cases.

It may be appropriate to let the user ask, during the course of the session, why a certain question is asked, or how a certain conclusion has been reached. Depending on the application, 'how' and 'why' capabilities are often desirable and sometimes essential.

The example chosen for this article, and which will be completely developed to the point where you can run it on your PC, is a subset of a real expert system currently under alpha-testing.

Option Strategies'-Expert System (OS-ES) provides investment advice in the area of listed stock options. Although this is perhaps a somewhat unfamiliar field to many APC readers, I have chosen OS-ES instead of the 'toy' expert systems so often found in academic literature — such as a fictitious psychiatric session or the 'twenty questions' game — to show that, within the limits spelled out later, you can indeed develop absolutely 'serious' and useful expert systems with DOS.

I'll briefly explain what OS-ES is about. Listed stock options are security contracts which give the right to buy (call option) or sell (put option) a given number of shares of the underlying stock for a fixed price within a limited period of time. Option contracts can be bought or sold in the exchanges, where they are listed in the same way that it is done for

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	e a key when ready ou bullish, bearish or neutral on the stock ?
bull	sh
R15∤ ·	you are ready to take (limsted/large/unlimited) ?
dim	ted
What	is the reward you are after (limited/large/unlimited) ?
limi	ted
limi	ted
1181	ted Recommended strategy BULL_SPREAD
	Recommended strategy BULL_SPREAD The record of this consultation has been added to file

Fig 3 Example of consultation as it appears onscreen

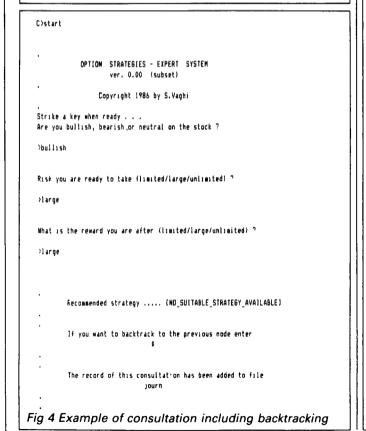


Fig 4 continued	
End of the consultation	
C)\$	
What is the reward you are after (limited/large/unlimited) ?	
bunlimited	
. Recommended strategy SYNTHETIC_LOWG_STOCK .	
. The record of this consultation has been added to file journ .	
End of the consultation	
¢>	

Record of the consultation	
Are you bullish, bearish or neutral on the stock ?	
bullish Risk you are ready to take (limited/large/unlimited)?	
limited	
What is the reward you are after (limited/large/unlimited) ? limited	
Recommended strategy BULL_SPREAD	

Record of the consultation	
Are you bullish, bearish or neutral on the stock ? bullish	
Risk you are ready to take (limited/large/unlimited) ? large	
What is the reward you are after (limited/large/unlimited) ? large	
Recommended strategy [NO_SUITABLE_STRATEGY_AVAILABLE	1

Record of the consultation	
Are you bullish, bearish or neutral on the stock ? bullish	
Risk you are ready to take (limited/large/unlimited) ? large	
What is the reward you are after (limited/large/unlimited) ? large	
what is the reward you are after (limited/large/unlimited) ? unlimited	
Recommended strategy SYNTHETIC LONG STOCK	

Fig 5 Printout of the file 'journ' with the record of the consultations

the shares of a stock. The attraction of options for many investors and portfolio managers is that they can be used, alone or in combination with the shares of the

underlying stock, to implement various advanced investment strategies.

Considering that option strategies can be very complex and the money involved

is often quite substantial, this is an ideal application field for expert systems.

OS-ES, of which the example given here is a subset, assists the investor in

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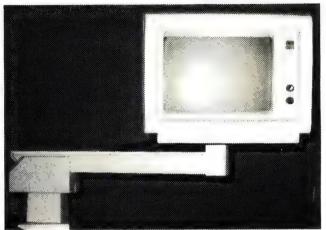
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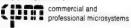
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the selection of a suitable option stragegy, depending on factors such as the attitude of the investor towards the stock, the risk he or she is prepared to accept, and others. Our subset of OS-ES covers the particular case in which the investor is 'bullish' on the stock — that is, he believes that the price of the stock will rise during the lifetime of the option. The complete expert system also includes the cases when the investor is 'bearish' on the stock — that is, he believes that the price will decline, or when he is neutral.

Here's a word of warning: as I have stated, OS-ES is, at the time of writing, still under testing, so if you do invest in options please refrain from using this subset for your investment decisions.

Writing the system

The knowledge base of our expert system is contained in Tables 1 and 2, and in Fig 1.

The option strategies considered are listed in Table 1. Each strategy is characterised by certain attributes: strategy s3 (bull spread) is, for example, suitable for an investor with a bullish attitude towards the stock, ready to take a limited risk only, and accepting a limited reward on the investment. These attributes are translated into answers to the relevant questions listed in Table 2. For the bull spread stragegy the answers to the first three questions are bullish, limited, limited. This, in turn, is reflected in the position of the strategy in the knowledge tree in Fig 1. The other ramifications of the tree are built up in the same way for the other strategies considered.

The tree itself consists of levels and nodes. The expert system reasons along paths, from one node to the other, asking questions whenever a piece of information is needed and then moving to the corresponding node at a deeper level, eventually reaching a solution: that is, a recommended option strategy (note that strategy sO is included for the cases when no suitable strategy is available with the attributes specified by the user).

Following the sub-tree in Fig 1 it is possible to code the knowledge base as a DOS batch file, which I have called kb.bat. It consists of three sections — 'rules', 'questions' and 'solutions'.

We start at level one, node A1. The answer to the first question, q1, will correspond to the first dummy parameter, %1, in kb.bat. If %1 is equal to bullish, we move to node B1. If %1 is equal to bearish or neutral, the recommended solution will be 'no suitable strategy available', because only

the 'bullish' sub-tree of the knowledge base is considered. If %1 is equal to none of the above, this means that either it is the first time that the ES has come to this node, or a 'non-acceptable' answer was entered. In either case, the program will prompt you for more information.

All this can be coded very simply:

IF %1 = bullish GOTO b1 IF %1 = bearish GOTO s0 IF %1 = neutral GOTO s0

GOTO q1

to be included at the beginning of the rules section.

......

In the questions section we will include the following:

:q1

ECHO Are you bullish, bearish or neutral on the stock? >> facts

ECHO Are you bullish bearish or neutral on the stock? and in the solutions section:

:s0

rec (NO_SUITABLE STRATEGY_AVAILABLE)

At the beginning of a consultation, when kb.bat is called for the first time, %1 will not be equal to any of the three acceptable answers to the first question (bullish, bearish, neutral) and control will be transferred to label :q1, where OS-ES will ask the question and also write it into file facts. To get the answer it must, at this point, return control to you, and it is here that the programming trick to mimic interactive input is required. In the rules section, before GOTO q1, we will have inserted the command ECHO %0 %%1? > \$.bat which, when executed, creates a new batch file, \$.bat, containing one line only - kb %1?. (Remember that the dummy parameter %0 is always replaced by the name of the batch file in which it is contained, and that %%1 becomes %1 when output is directed to another file.)

In the questions section, just after the second ECHO command with the text of question q1, we insert ppp. This is a call to a separate batch file, ppp.bat, consisting of two lines:

ECHO OFF

PROMPT \$G

The effect of calling ppp.bat is twofold: the execution of kb.bat is interrupted; and control is returned to the keyboard. The prompt is changed to '>'. The following two lines will thus appear onscreen:

Are you bullish, bearish or neutral on the stock?

>

You will then enter the appropriate answer just after the prompt. This particular question admits, as we have

seen, three acceptable answers — bullish, bearish and neutral. We will have created three identical batch files — bullish.bat, bearish.bat and neutral.bat — containing the following four lines:

ECHO OFF
CLS
ECHO %0 >> facts
\$ %0

When the answer bullish, say, is entered it is written to the file 'facts', just after the line containing the question asked. The batch file \$.bat is then called, which, remember, contains one line only — kb %1?. At call the dummy parameter %1 is replaced by the name of the calling batch file (that is, bullish) to obtain kb bullish?.

At this point kb.bat is called again, with bullish replacing %1 and? replacing %2. At node A1 the first IF test is fulfilled (bullish = bullish is true) and the next command to be executed will be the one following label:b1.

What we have managed to do, in short, is to make the ES ask for the information it needs.

When the answer is entered the ES starts again from the first rule, but — being now in possession of the relevant information — it moves to the next node in the tree. This control strategy is called forward chaining in Al terminology.

In the process it has also recorded question and answer, so keeping track of the conversation with the user (tracing capability), and changed the prompt to emphasise that you are within the program environment.

Convenient error-trapping is also automatically provided. You must distinguish here between 'acceptable answers' for a given question and 'legal answers' for the entire ES. Acceptable answers for a given question are those which transfer control to a new node or to a solution. Acceptable answers for questions q1 are bullish, bearish or neutral; they are also legal answers, as are all the other acceptable answers for all the other questions in the tree. In our example, bullish, bearish, neutral, limited, large, unlimited, yes and no are all legal answers, and the ES contains eight identical batch files with these file names.

Error-trapping works as follows. If a legal, but not acceptable, answer is entered — for example, if yes is entered in reply to q1 — the question is repeated, because the conditions in the IF subcommands at node A1 are not true. If an illegal answer is entered — for example, bullis instead of bullish — the following message is displayed:

Bad command or file name.

Simply because the batch file

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bullis.bat does not exist. In both cases the prompt '>' follows, and you can enter an acceptable answer.

But let's come back to node A1. Had the answer to the first question been bearish or neutral, control would have been transferred to label :s0 in the solutions section of kb.bat. The batch file rec.bat would have then been called with the parameter: (NO_SUITABLE_

STRAGEGY_AVAILABLE).

The file rec.bat is the output manager of the expert system. It has three functions: displaying the recommended strategy onscreen; writing it into a file 'journ' preceded by the information contained in the file 'facts' (that is, the list of questions asked and answers received); and, in the case of the strategy sO, instructing you on how to backtrack, if desired, to the previous decision node. Backtracking is possible because \$.bat maintains a 'memory' of the facts learned by the system so far.

The original prompt is finally reestablished, indicating that you have left the program environment. The listing of rec.bat in Fig 2 shows the details of the

implementation.

Coding the other ramifications of the knowledge base is now just a matter of repeating, at each node, what has been done at node A1. At each level a new question is included in the questions section, and a new dummy parameter is added when ECHO-ing to \$.bat. If a question is irrelevant to certain solutions, the corresponding level in the tree is ignored; therefore, only relevant questions are asked, provided that the tree is properly structured. At certain nodes, a new solution is reached and added to the solutions section.

The resulting code is straightforward and easy to read, as you can see by simple inspection of the listing of kb.bat in Fig 2. Just remember that all legal answers must be present in the ES as batch files: in our example, these are bullish.bat, bearish.bat, neutral.bat. limited.bat, large.bat, unlimited.bat, yes.bat, no.bat. (Note that unlimited.bat will actually be unlimite bat, as in DOS a filename can't exceed eight characters; this has, however, no practical consequence here.)

Now we need a way to start the program. This can be done through a file, start bat, which may contain the title and some information on the ES, and must include, at the end, the following two lines:

IF EXIST facts DEL facts kb?

The first line deletes — if it exists — the file 'facts' containing the trace, now useless, of the previous consultation, and the second line actually starts the

program by calling kb.bat with '?' as first parameter. All you have to do to start a consultation is to enter 'start' after the prompt.

This, rather lengthy, description can be summarised by saying that the entire expert system consists of the following elements:

- a starter (start.bat);
- a knowledge base (kb.bat) containing three sections rules, questions and solutions; and
- the I/O management files (ppp.bat, rec.bat, bullish.bat, ..., no.bat).

A listing of all the files which constitute the expert system of Fig 1 is shown in Fig 2. The code is reasonably self-explanatory, and you should have no problem in following it with the help of Fig 1. In order to improve legibility I have reserved capital letters for the DOS commands and the solutions, and used a structured style in writing the code. The sub-command ECHO OFF occupies the first line in all files, to avoid the situation where all the following lines will be shown onscreen. Only useful messages will appear instead.

With the exception of ppp.bat, all files include the command CLS in the second line to clear the screen. In practice you will see ECHO OFF briefly flashing on the screen, and then the next useful message or the prompt. The impression of a completely interactive system is almost perfect.

Fig 3 shows an example of consultation as it appears on the screen; Fig 4 is a consultation including backtracking; and Fig 5 is a printout of the file 'journ' with the record of the above consultations.

You may wish to run the ES on your PC and see how it behaves in actual use. At the end of the session, consisting of one or more consultations, you can print out the file 'journ' which contains the complete record of the session; 'journ' should then be deleted, unless you want the record of the next session to be appended to it. The other two files created during the session — \$.bat and facts — are automatically dealt with by the program and you don't have to worry about them.

Using a RAM disk

An expert system using DOS as an inference engine is fairly slow, especially if it runs directly from disk. This is due to the frequent jumps from one batch file to the other, and the fact that the GOTO sub-command does not immediately transfer execution to the line following the label, but lets the system also scan all the lines in between. This considerably slows the execution, particularly when

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Robert Smith review "Australian Computing April 1986".

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the system has reached a deep level in the tree. Much strain is also imposed on the disk drive, which is kept busy all the time.

A better method is to copy the ES, together with any external DOS command used, into a RAM disk and run it from there. The increase in speed is remarkable and there is no overload on any disk drive. A further marginal increase in speed can also be obtained by using a run-time version of the program, where all the comment lines (those beginning with REM) have been suppressed. Nonetheless, you shouldn't encounter any problems when running the OS-ES subset.

The complete OS-ES comprises, in the present version, eight levels and more than 20 strategies. It runs quite efficiently in RAM, and is barely acceptable when run from disk. More complex expert systems may, however, become unacceptable slow.

Limitations

The major limitation of DOS as an ES shell is the inability to perform mathematical calculations other than the simplest form of equivalence. The batch sub-command IF string 1 = = string 2command actually compares the ASCII values of the characters in string 1 and string 2. Thus, while 2 = 2 is true, 1+1=2 is false (for the same reason as a = A is false, so watch out when using both capital and small letters in the code). Consequently, DOS can be used as an inference engine only for expert systems not involving mathematical calculations.

Nondeterministic systems requiring fuzzy logic are typically excluded, since probabilities can't be calculated, but there are many applications for which this is not a serious constraint.

Another limitation is that only up to 10 dummy parameters — %0 to %9 — can be specified within a batch file. As %0 is reserved to the file name, this means that in practice the expert system can only contain up to nine levels, although this limit can perhaps be increased by clever use of the SHIFT sub-command, which allows command lines to make use of more than 10 replaceable parameters. But nine levels are not too bad, and there is no limit to the ramifications between levels (that is, the number of acceptable answers to a given question).

Conclusion

DOS can be used to develop simple expert systems with many desirable characteristics. The knowledge base is easy to code, read, maintain and update. Friendly interface, backtracking capaerror-trapping and tracing/ recording facilities are all available.

It is worth noting that what is possible with DOS is certainly possible with the more powerful operating systems used in minis and mainframes. Coding is equally easy, interactive I/O and a larger choice of commands are available, mathematical calculations of some complexity are possible, and execution speed is not a problem. Using operating systems as inference engines may indeed prove a convenient way, in certain cases, to develop expert systems without having to learn a new programming language or buy expensive commercial shells.

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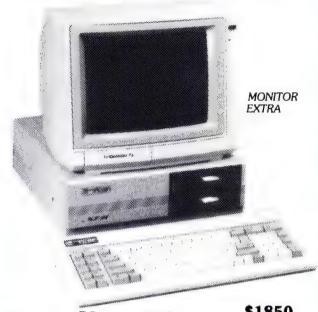
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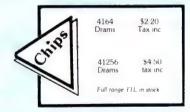
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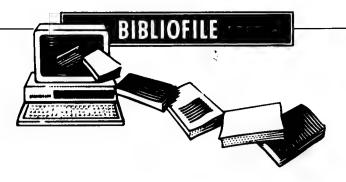
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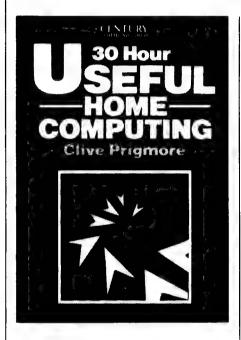
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From an introduction to PC-DOS and MS-DOS to a quick 30 hour stint on home computing, David Taylor sifts out those books worthy of salvation.



Beat the clock

Mr Prigmore believes he can teach you in 30 hours to harness your hitherto frivolously-used home micro to perform really useful tasks. I do not.

What he has in mind is mastering word processing, spreadsheets, databases, stock control, mail-merging, filing, accounting — stuff like that.

You might think he's crackers, but Mr Prigmore knows he's already done a similarly structured book to teach Basic in 30 hours and that sold 150,000 copies, so there.

Carry on, Mr Prigmore.

'Figure 2 shows a thin plastic disk covered in magnetic material, housed in a plastic envelope.'

Oh, no. Not another picture of a square with a circle in it, please.

'When you come to input data, and particularly text when word processing, you will find it most convenient to have a standard typewriter or 'Qwerty' keyboard, especially if you are a trained typist.'

Indeed, I have to agree that I, too, have

found such to be the case.

'The words LOAD and RUN are examples of commands which belong to the high-level programming language called Basic.'

They surely do.

'If your interests involve any type of numerical calculation, either simple or complex, then a spreadsheet package will be of great value to you.'

No question.

And so it goes on and, I don't doubt, will again sell very well. Just don't ask me to recommend it.

Title: 30-Hour Useful Home Computing

Author: Clive Prigmore

Publisher: Century Communications/

Hutchinson

Price: \$32.95

Easy DOS It

Not a man to leave anything to chance, this all-American Mr Sheldon. 'The first thing to do,' he advises, 'is to locate the DOS disk.' 'Ere, hang on, not so fast! Where's our little picture, then? There's always a little picture of a floppy disk. Yup, here we are, page 85: drawing of a square with a dotted circle inside it and an arrow to point out the write-protect notch. Can't be too careful. Righty-ho, carry on... 'Now all you have to do is to place the disk in the start-up drive, label side up, and turn the system on.'

Reckon you're getting the hang of it so far? I mean, you do start to wonder whether this is a book for beginners or for half-wits. I cannot for the life of me see the point in churning out page after page of instructions so stupefyingly obvious that anyone having trouble at this level might need a set of manuals to tie up a shoelace.

The book does get more testing as it chugs on, and is well enough produced, but it's wearisome to go over and over so much familiar ground. I suppose the theory is that since there are now well over 50 PCs, aside from IBM's bestselling

old stager, which operate with Microsoft's masterpiece (or a slightly tailored version of it), that must be one enormous potential market for a DOS primer. Never mind that, well over 50 PC makers have already taken a crack at improving IBM's original pink ringbinderful of instructions, or that perhaps 50 or more authors have also had a go at trying both to simplify and to expand on DOS.

Here we go yet again: creating files, how to work EDLIN, getting to grips with tree-structured directories and batch files, what does FORMAT do (if you don't know that, you had better read this book!), some tips on getting DOS to assign a RAM drive or to perform extra file-sorting tricks, accept customised commands, and so on. It's all very cautiously step-by-step and thorough. You can get to Chapter 28, well into the Part II advanced section, and still come across sentences like: 'The printer is one of the biggest assets to your computer system; without it there would be no hard copy.' Struth!

Mr Sheldon, by the way, lives in Santa Barbara where he is engaged in developing 'user-friendly shells for computers.' If ever he plans an even more simple-tograsp book on those, he could perhaps ask Postman Pat to ghost it.

Title: Introducing PC-DOS and MS-DOS

Author: Thomas Sheldon Publisher: McGraw-Hill

Price: \$39.95

Word gets around

One of a first-class series, this, which not only holds hands as you familiarise yourself with such Microsoft winners as Word or Chart, but also includes Cary Lu's nothing-if-not-comprehensive guide to the Mac and the redoubtable Bill 'Cracker' Landreth's confessions of an FBI-busted hacker.

The Katers (who, by the way, wrote Epson's printer manuals) are here concerned with Microsoft Word, for my money the best word processor there is,

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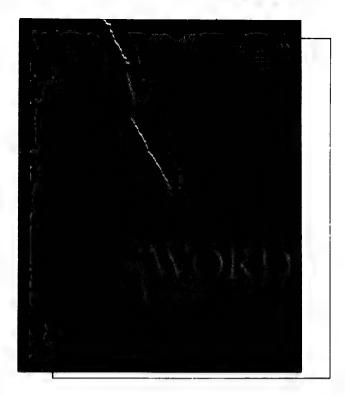
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running on the Apple Mac, to which I've also taken quite a shine.

I can't fault their authority, nor yet their lucid style. In some ways, Word is the more remarkable when run on IBM's PC, and the Mac's quite separate strengths with bog-standard MacWrite, are not so obviously out-classed by Word. Still, it's a formidable combination just the same. Word's bells-and-whistles versatility and Mac's ease of use, never more so than when the Katers get to grips with what can be achieved using top-of-the-line printers (like the fabulously good, quick and expensive LaserWriter) - professional reports that make full use of Word's fancy formatting, multi-column newsletters that incorporate graphics and tables, even high-quality brochures or business forms which would not shame a professional typesetting house.

Great stuff if you can afford it: \$34.95 isn't bad for the book. If you can persuade your company to stump up a few thousand for the rest of what you need to get going, I shouldn't hesitate.

Title: The Printed Word

Author: David A Kater, Richard L Kater Publisher: Microsoft Press/Penguin

Price: \$34.95

Ask me another

This is more like it: an update (15 years on from its pioneering first edition, eight from the second) of an excellent, cogently comprehensive reference work.

Mercifully, no-one cracks on this book

is going to tell you all there is to know about computers or life-as-we-know-it. Its simple (yet immensely useful) purpose is to list and, where appropriate, to crossreference every piece of esoteric jargon, perplexing acronym, every bewildering mouthful of computerspeak you are likely to stumble across, and to provide a crisp definition or lengthier explanation to put you right or to point towards more detailed info.

A respectable number of topics are set out as précis: thus the layman can locate a chunk of text on, say, programming, central processors or storage devices, while there are dozens of more technical essays on, for example, Boolean algebra, languages, debugging or virtual storage.

All of it is lucid and indeed entertaining. It is tempting to read the entire dictionary as narrative, since unlike so much of the gunk we are sent from prolix Americans, it is extremely well written throughout.

For \$9.95 it's a snip.

Title: The Penguin Dictionary

of Computers

Author: Anthony Chandor with John Graham & Robin Williamson

Publisher: Penguin

Price: \$9.95

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Thanks for the memory

Samual Dick describes the functions of a memory management unit, and explains why such a unit is an invaluable aid in extracting the maximum performance from a micro.

The ability to extract a litre out of a 500ml jug has, like alchemy, long been sought after by mankind. Today, the problem reappears in the computer world — the quest continues to extract the maximum performance out of any computer. As software has become more complex, it has grown in size; operating systems and compilers with storage requirements near 1 Mbyte are not uncommon, and applications programs can certainly exceed them in size. In many cases, such as digital image processing, it may be the data to be manipulated which takes up the space.

The increasing complexity in software has been matched by the improvement in hardware performance. Processors are intrinsically more able due to their rich instruction sets and different addressing modes. They are increasingly supported by intelligent peripheral handlers, floating-point math chips, and real-time interrupt control units. One of these support chips is the Memory Management Unit (MMU). Totally transparent to the high-level applications programmer, the memory management unit has helped systems programmers to tackle the space problem created by the ever-increasing size of software packages. With common processors, like the 68000 or National Semiconductor's NS16000 series, which routinely have 16Mbyte address spaces, the MMU's function is becoming more important.

Filling the jug

To understand how the MMU goes about its task, we must look at how a computer goes about executing a program. Typically, the program will have been written in a high-level language such as Pascal or Fortran, and will have been stored on a disk or tape as source code. In order to translate the source code into an executable form (machine code), the source is compiled to produce object code. Object code is rather like machine code, except that references to code called in by the program are left in dummy form. For example, a user might have written a program which is required to write to the VDU screen (a Basic 'Print' command, for example). At compile time, the compiler will translate the Print command into a call to a system subroutine which has the task of writing the required string to the VDU. However, the actual address at which the system routine starts will not be appended only its name will be sent to the object

This may seem to be an example of double-handling, but its advantages will be explained eventually. The task of going through the object file and

inserting the machine code referred to by the compiler's calls to routines is handled by the linker. The linker reads in the object file and searches in system and/or user libraries of subroutines to complete the references made by the compiler, and outputs the resultant executable image. The executable image is a file of the machine code instructions that will be resident in the machine's core when the program is run.

At run time, the operating system loads the executable image into core. To take a simple system, the image will have a start and end in the processor's address space and will be present in core for the duration of its life — that is, until the running program ends.

The Run command sets the program counter to the start address of the image, and execution commences. Such an 'absolute loader' (Fig 1) relies on the addresses used in the executable image being those that will be used as the program runs. For example, if a program uses a GOTO instruction, then the compiler will have translated it into a JMP \$12E3 instruction where 12E3 is the hexadecimal address of the GOTO's destination. The addresses used as destinations of GOTOs or subroutine calls must be known at link time. The linker produces machine code for the executable image exactly as it will be at run time.





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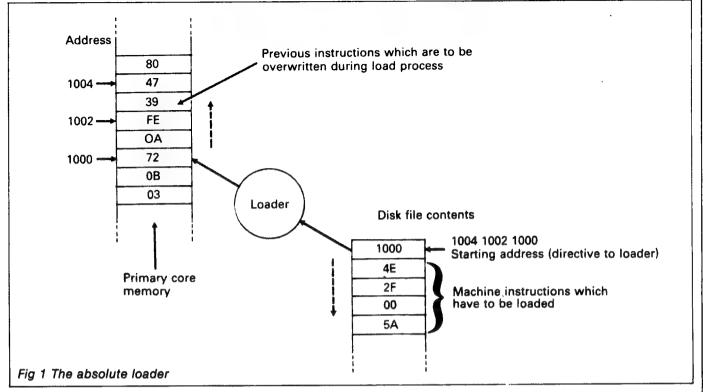
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SOFTWARE



However, this simple loader has its disadvantages. The processor's address space may not be clear of other programs and memory-mapping addresses for peripherals, so the loader might have to transfer the program into different parts of memory, depending on the space available.

To solve this problem, the relocating loader is used and the compiler is designed to produce object code which is compatible with the loading technique. Now, the executable image may be placed anywhere in core because the image stored on disk or tape does not

contain absolute addresses — instead, it contains offsets calculated relative to the start of the program. When the program is loaded, a constant is added to all the offsets to produce the absolute address. This is illustrated in Fig 2.

The simple relocating loader allows you to place a program anywhere in the processor's address space by changing the constant, and the final decision about where it is placed can be deferred until the program is run. In a large multi-user machine, user A's program might be run in the space \$115A to \$12FF today but in \$1044 to \$11E9 tomorrow, because

those are the only locations in core which are not being used by any other users (this fact will not necessarily be known by the user and will not affect the running of the program).

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With old computers, small users would stand in awe of large users who, when they piled their stacks of punched cards on the computer operator's table, would write 'Full Core' on their Job Request Card. This two-word incantation signified that their job was so large that the whole of the processor's memory (which might have been only 32 kilowords) was required. Today, such precautions are not necessary due to the advent of 'virtual memory'.

The concept of virtual memory is simplicity itself. When you consider the way in which a processor runs a user's program, you see that the processor is only executing one instruction at a time; as far as it is concerned, the other parts of the program might not exist.

Virtual memory systems recognise this, and only keep a small part of the user's program in core at any time. The part in core is, of course, the section of the program which is executing or about to be executed by the processor. The remainder of the program is held on disk, and can be called into core within a few milliseconds when it is required.

The memory of the processor — both

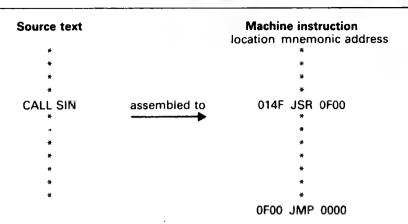
-	Address	Contents
	0000	7F CLR 8005; clear location 8005
	0001	80
	0002	05
	0003	86 LDAA FF; load accumulator A with 255
	0004	FF
	0005	B7 STAA 8004; store accumulator A to location 8004
	0006	80
	0007	04
		Relocation table
A	Address	Contents

Machine code (6800)

Address	Contents
Arbitrary +1 +2 +3 +4	 00) 0001 and 0006 are two addresses which 01) require relocation in the above machine code. 00) The addresses starting at 0001 and 0006 will 06) have an offset added to them before execution

Fig 2 Relocation schematic

SOFTWARE



Linker uses a jump instruction with dummy jump address, and places SIN and 0F00 in the symbol table

Once the linker locates the SIN function, the dummy jump address (0000) will be replaced with the real address of the function

Symbol table

Function Address of Jump

Fig 3 Linking

the actual core of the machine and the disk space allocated as virtual core — is partitioned into 'pages' which are typically 512 bytes in size: a 16Mbyte address space will have 32k pages. Most of these pages will be held on disk — 'swapped out to disk' — while perhaps only 1Mbyte or 2k pages will be resident in the machine's memory. Now you can see why litres do fit into 500ml jugs — it's just that not all of the litre is in the jug at any one time!

The pages come in two varieties: physical pages, which are pages of real memory — 'core'; and virtual pages, which are purely a software convenience. To see how the pages work and how the processor organises its memory at run time, let's consider an example.

A user runs a program on the machine. The operating system allocates the program 20 pages (virtual), which are numbered from, say, 101 to 120. The program starts at page 101 and ends at page 120. When the system loads the program, only five physical pages are available in core, so pages 101 through 105 are loaded into memory and the processor starts to execute code contained in virtual page 101. As execution proceeds, page 105 is finished with, and as there is no more physical memory containing program instructions, virtual pages 101 through 105 are swapped out to the disk and the next five virtual pages are brought in to core. When that has been done, execution of the program continues.

This is the importance of the relocating loader — being able to swap pages of program code to and from core relies on being able to execute code anywhere in the address space.

Invisible to the CPU

Keeping track of which virtual pages are in core and which are swapped out to disk would be very wasteful of processor time: it would have to calculate the physical address for each memory

access from the virtual address.

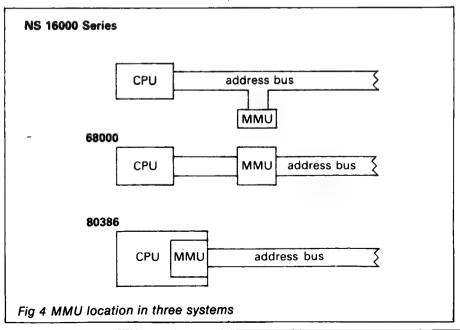
Enter the Memory Management Unit. Each time the processor attempts to access a memory location, for either a read or write operation, the MMU translates the virtual address contained in the software to the physical address. If the physical address is in core, the memory access proceeds. If the required location is not resident in core, the MMU will set about loading the page of memory containing the required location from disk into core. This translation and loading is invisible to the processor and the user; all the user sees is a large program or large arrays of data being handled effortlessly by the machine.

The translation procedure is performed by the MMU with the help of the operating system. Inside the MMU, a table is maintained of correspondence between virtual and physical pages — rather like a dictionary which allows us to translate between languages. This table is maintained by the operating system and the MMU, and is typically known as the Page Translation Cache.

Apart from memory management the MMU performs other duties.

Within the MMU, the operating system can set protection flags on a page that, for instance, allows read-only access or access only to privileged users. Protection is important on most multiuser systems: it helps prevent the hacker syndrome and, in real-time applications, where a multi-million dollar facility is being controlled online, it can prevent software bugs from spreading catastrophe.

Dynamic (at run time) debugging is simplified by the MMU because it can carry out hardware breakpoints during program execution, and can also trace



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SOFTWARE

the last few operations of a program before, say, a conditional GOTO. Anyone who has ever used a dynamic debugging tool appreciates the immense aid it represents — the ability to make the processor watch certain variables (to see when they change value), examine the value of or deposit a new value into a variable while the program is running greatly eases detection of non-syntax errors.

The MMU can also keep an eve on hardware errors. Most memories have sophisticated error correction and control hardware built-in, and virtual memory systems help the computer engineer to design-in robustness. When the machine runs its diagnostics, extensive checking of physical memory takes place. If a fault is found, the software marks the page in which the error occurs as 'unavailable'. As the operating system is accustomed to shunting pages of virtual memory around to place them in unused physical pages, the avoidance of bad pages of physical memory does not cause severe problems; a large number of bad pages will only slow down the machine because more swapping has to be done to avoid them.

Working together

With memory management units proving so useful in address translation and debugging, it is obvious that they should be an integral part of any system architecture. How do the processor and the MMU work together? The exact method is dependent on the processor.

The National Semiconductor 16000 series processors (which range from 8bit through to 32-bit CPUs) use a different technique to Motorola's 68000. When a 16000 series processor wakes up after a Reset command, it checks to see if an MMU is present. If the MMU is not present, memory accesses take four clock cycles: the address is placed on the address bus during the first cycle while the data is read-in during the fourth cycle. However, if the MMU is present, the processor configures itself so that memory accesses take five machine cycles. The processor places the virtual address onto the address bus during the first cycle. On the second cycle, the MMU places the translated (physical) address onto the bus and issues a Physical-Address-Valid signal. The data is latched into the processor during the fifth cycle when the Read-Data strobe has been activated. Contention over the address bus while the MMU is in control of it is prevented by the processor placing its address port into a high-impedance state, leaving the Clock cycle: one period of the system's timing oscillator

Handler: hardware and software designed to allow the processor

to control a peripheral

Linker: a program which 'joins together' the various procedures

in a user's program

Loader: a program which loads primary memory from the

secondary store

Offset: that part of an address which represents the location of

a byte within a page

Page: an arbitrarily-defined section of memory — typically 512

bytes

Page fault: a state generated when the page required by the

processor is not in core

Page number: that part of an address which defines which page a

particular address occurs on

Page table: a section of memory (which may be within the memory

management unit) in which the map giving the relationship between virtual and physical addresses is

kept

Physical address: the address which will be present on the address bus of

the memory

Relocation: the process of moving a section of code in memory or

altering the addresses within a section of code so that the code executes in a manner independent of its place

in core

Symbol table: a section of memory used by the linker which acts as a

cross-reference dictionary for the calling address of

subroutines, functions, and so on

Virtual address: the address which is placed on the address bus by the

processor — a notional address which has to be translated by hardware into a physical address

Fig 5 Glossary

MMU to specify the physical address.

If the MMU has to update its internal translation table or a page of virtual memory has to be brought into core, the MMU goes about the action autonomously.

The 68000 processor also has an MMU chip. Unlike the NS16000 series MMU, the 68000's unit is placed in the address bus between the processor and the memory. If a page is selected and results in an access violation because the page of virtual memory has to be loaded into core, the 68000 idles until the page is made available. In multi-tasking systems, the idle time would be allocated to another user so that no machine time is wasted.

The Intel 80386 processor contains a memory management facility within the processor chip itself, which breaks the memory space of the processor into pages just like the other processors. Intel uses larger pages (4k), which allows the 4Gbyte physical address space of the machine to be mapped within the registers held in the processor.

Conclusion

What do virtual memory and the MMU mean to the average user? The advantages are really only apparent on large systems, although there is nothing to stop MMUs being used on 8-bit micros. With large, powerful machines,

virtual memory gives the programmer freedom from having to worry about fitting a program into the physical (core) memory of the machine. Images, perhaps 2048x2048 pixels in size, can be handled using a machine with only 1 Mbyte of core. As code has to be able to be used at any address in core, compilers and linkers produce machine code that can be shared between users so that the machine gives a truly interactive feel. Virtual memory brings us one step closer to having the perfect machine which is free from all physical constraints — just what the users want.

And the MMU? It just sits quietly by the processor, helping as required. The MMU lets even the processor forget that it has a limited physical memory, and guards sections of memory against illegal access. If someone is debugging, it helps the processor watch for users' program breakpoints.

And what of the future? An attractive scenario is one where each individual has a powerful, personal workstation — almost a return to single-user systems. As the price and physical size of fast-access semiconductor memory continues to decrease, it is tempting to speculate that the importance of virtual memory will decrease. The full addressing range of even 32-bit processors may be fully implemented as core — then litres will fit into 500ml jugs.

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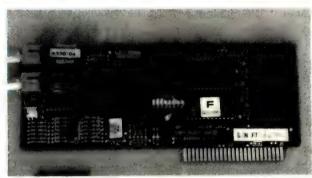
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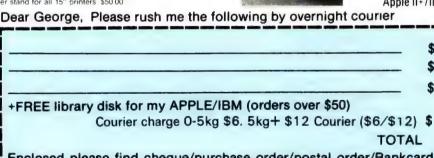
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Enigma variations

Throughout the Second World War, and also in civilian life, the Enigma cipher machine was a vital key in security. CJ Davies describes the intricacies of both the civilian and military formats, and presents a Basic Enigma simulation program.

The German Enigma cipher machine of the Second World War was basically a simple machine, but it required the work of many of the finest minds to decode enciphered messages — and even this was only possible when the machine was used in a careless manner. Even today, it would be difficult, if not impossible, to decipher a message which had been doubly enciphered on the machine, without a prior knowledge of the machine settings used.

Civilian Enigma

The Enigma machine in its most basic form was invented in the 1920s, and was patented for use in banks and similar institutions. Externally the machine consisted of a keyboard similar to a typewriter's, but without numeric or punctuation keys. Above the keyboard was a panel marked with the 26 letters of the alphabet, with a small electric bulb above each letter. When a key was pressed, a light on the panel would be illuminated; the letter below it was the incipherment of the character on the key, and would be written down by the cipher clerk.

An important feature of the machine was that it was self-inverse — that is, no special decipher setting was required. If two machines were set to the same starting configuration, cipher text produced on one machine could be converted into plain text merely by entering it on the other.

Another feature of the machine was that a character could not be enciphered into itself.

The keys operated electrical switches which sent an electric current to one of 26 electrical contacts arranged in a circle on the inside of the front casing of the machine. The connection pattern was quite straightforward; the A character being connected to the first contact, B to the second, and so on. Inside the casing, mounted on a common shaft, were three rotors, each of which had 26 electrical

```
ENIGHA HAIN PROGRAM
            REM
 1010
            DIN R1(28): DIN R2(28): DIN R3(28): DIN REF (28): DIN P80(28)

LET N = 1888: DIN AX(N): DIN B(3): REM INPUT BUFFERS

LET CTR = B:RFLAG = 8
 1939
            LET CTR = BIRFLAG = B
BOSUB 2428: REH BET PLUBBOARD
BOSUB 4180: REH BELECT ROTORS
BOSUB 3150: REH BET ROTORS
BOSUB 3510: REH BET ROTORS
BOSUB 2790: REH PASS THRO PLUBBO
BOSUB 2790: REH PASS THRO ROTORS
BOSUB 2790: REH PASS THRO ROTORS
1070
            GOGUS 2676; REH PASS THRO ROTORS
GOGUS 2796; REM PASS THRO PLUGSCARD
IF RFLAS = 1 THEN 1888
1140
            GOGUE 2198: REH DUTPUT TEXT
            END
                         INCREMENT ROTORS ROUTINE
            REH
GOBUB 1388: REH INCREMENT ROTOR I
 1170
            LET N1 = N1 + 1; IF N1 < 29 THEN 1200
            LET NI = 1
806UB 1378: REH INCREMENT ROTOR 2
 1210
 1229
            LET N2 . N2 + 11 IF N2 < 29 THEN 1288
            LET N2 = 1
908UB 144B; REH INCREMENT ROTOR 3
 1240
 1250
             LET NS - NS + 1: IF NS < 29 THEN 1200
            LET NS = 1
RETURN
REM
 1278
 1200
            REM
REM INCREMENT ROTOR 1 ROUTINE
REM
LET TEMP = R1(1)
FOR K = 2 TO 28; LET R1(K - 1) = R1(K); NEXT
LET R1(28) = TEMP
RETURN
REM
REM
INCREMENT ROTOR 2 ROUTINE
 1310
 1326
1330
1348
 1360
 1378
1386
1398
            LET TEMP = R2(1)
            LE: 1839 = RZ(1)
FOR K = 2 TO 28: LET R2(K - 1) = R2(K): NEXT
LET R2(28) = TEMP
 1400
 1410
 1420
1430
            RETURN
 1448
1450
1460
                         INCREMENT ROTOR 3 ROUTINE
            REM
LET TEMP = R3(1)
            FOR K = 2 TO 20: LET R3(K - 1) = R3(K): NEXT
LET R3(28) = TEMP
RETURN
 1478
 1486
1490
1500
1510
             REM
                     INPUT A CHAR ROUTINE
 1520
1530
1540
1550
             REH
            REM

GET AS

IF MODE = 4 THEN 1648

IF ( ABC (AS) < 65) OR ( ASC (AS) > 98) THEN 1578

IF ( ABC (AS) < 78) OR (MODE < > 1) THEN 1688

IF MODE = 1 THEN 1658

IF AS = " " THEN AS = "*"

IF (AS = "*") OR (AS = "8") THEN 1688

IF MODE < > 3 THEN 1658

IF MODE < > 3 THEN 1658
 1579
 1586
1596
 1600
            IF NUMBER ( ) 3 THEN 1658

IF AS = CHRS (18) THEN 1688; REM (-

IF AS = CHRS (18) THEN 808UB 1868; IF RFLAG = 1 THEN 1688

IF AS = CHRS (16) THEN 1688; REM ESCAPE

IF AS < CHRS (17) THEN 1688; REM ESCAPE
 1626
 1630
 1648
            IF As < > CHRS (1) THEN 1678
HOME : END : REH CTRL-A ABORT
PRINT CHR$ (7);: GOTO 1538
Fig 1 The Basic Enigma simulation program
```

contacts on each side. The contacts on one side of a rotor were connected to the contacts on the other side, in a jumbled manner. The electric current from one of the contacts on the inside of the front casing would enter a contact on the front of the outermost rotor, and exit from a contact at its rear. It would then pass in a similar manner through the middle rotor and, finally, through the innermost rotor. Behind the innermost rotor was a fixed set of 13 wires, each connecting two of the contacts on the back of the innermost rotor; this was known as the reflector. After passing through the reflector, the current would pass back through the rotors (the path followed would, through necessity, be different from the incoming path). The current would leave the casing through one of the contacts on the front casing and illuminate the corresponding bulb.

It can be seen that if a given rotor setting transformed an R into a J, then it would also transform a J into an R. After each character had been enciphered, the outermost rotor would be stepped forward by one position before the encipherment of the next character. When the outermost rotor completed a revolution, the middle rotor would be incremented, and so on, in the manner of an odometer. (In practice the Enigma varied somewhat from this, but if you assume that the opposition knows how the machine works, which you should, then you might just as well use the straightforward way.)

Before the machine was used, the positions of the three rotors would have to be set to a pre-arranged starting position. As each rotor could be set to any one of 26 positions, the number of possible configurations was, with fixed rotors, 17,576 (26³). The period of the machine was also 26³.

For readers not familiar with the concept of the period of a cipher machine, it means that if the same character were enciphered repeatedly, then the machine would produce an apparently random sequence characters; this sequence of characters would start to repeat itself once the period of the machine was exceeded. Provided that the period of a machine is longer than the longest message to be transmitted, then the period is not of vital importance - but the number of configurations most definitely important. From the point of view of military use, 263 configurations would be hopelessly inadequate as they would be easy to crack using the brute force method of trying all configurations.

Before I go on to describe the modifications made to Enigma to render it suitable for military use, I must point

```
Continued
1788 REM CONVERT A CHAR ROLITINE
1710
           REN
1729
1739
1740
1740
           IF As = "+" THEN PTR = 27: 80TO 1758
IF As = "0" THEN PTR = 28: 80TO 1758
          LET PTR = ASC (A$) - 64
RETURN
1760
1770
1700
1700
           REN
           REM CHECK CTRL-P DK ROUTINE
           LET BFLAG - 8
          LET SFLAG = 0

IF CTR > 2 THEN 1840

IF (CTR = 0) AND (HI < > 0) THEN 1848

IF (CTR = 1) AND (LQ = 1) THEN 1848

LET SFLAG = 1:CTR = CTR + 1
1800
1818
1828
1838
1848
1850
1860
1870
           RETURN
           REM CHECK CTRL-R DK ROLITIME
           REN
1880
1890
1980
           IF HI < LO THEN 1988
           LET RFLAG = 1
RETURN
1918
1928
1938
           REM
                  PROCESS A CHARACTER ROUTINE
           REH
           LET PTR = R1(PTR):PTR = R2(PTR):PTR = R3(PTR)
 1948
1950
           LET NOL = REF (PTR)
FOR K = 1 TO 28
1978
           IF R3(K) = NOL THEN NOL = KsK = 28
1980
1998
2980
2018
2029
2036
2040
2059
2060
           NEXT
           FOR K = 1 TO 28

IF R2(K) = NDL THEN NDL = K:K = 28
           NEXT
           FOR K = 1 TO 28
           IF R1(K) = NOL THEN OUT = K:K = 28
           RETURN
REH
2979
2989
2998
                   PASS THRO ROTORS ROUTINE
           REH
           HOME : FLASH : PRINT "STANDBY PROCESSING TEXT": NORMAL
2100
           FOR J = LO TO HI
2110
           LET PTR = A%(J)
2120
2130
           GOSUB 1920; REH PROCESS A CHAR
LET A%(J) = OUT
2140
            908UB 1170: REH
                                          INCREMENT ROTORS
           NEXT
2140
           RETURN
2170
           REM
2188
           REM OUTPUT TEXT ROUTINE
2198
           REH
2200
           HOME : PRINT "OUTPUT TO SCREEN OR PRINTER ? ( S OR P ) -->";
           HUNE: PRINT "DUTPUT TO SCREEN OR PRINTER ? ( S OR P ) -->";

LET MODE = 3; SOSUB 1518; REM INPUT A CHAR

IF As < > "S" AND (As < > "P") THEN PRINT CHR$ (7);; GOTO 2218

PRINT As: IF As = "S" THEN 2258

PRINT CHR$ (4); "PR01"
2229
2238
2248
2258
2258
2268
2278
           PRINT CHRS (4); PRUITED 1 TO HI
LET OUT = AX(J)
GOSUB 2358: REM RECOVER CHARACTER
PRINT BS;
1F (AS = "P") AND (J / S0 = INT (J / S0)) THEN PRINT
 2280
2299
2388
           NEXT
 2310
           PRINT
2320
2330
           IF As = "P" THEN PRINT CHRs (4); "PROG"
RETURN
 2340
2350
2360
            REM RECOVER CHARACTER ROUTINE
           REH
           IF OUT < 27 THEN B$ = CHR$ (OUT + 64): GOTO 2488

IF OUT = 27 THEN B$ = """: GOTO 2488

LET B$ = """
 2370
2380
2396
2480
2418
           RETURN
2429
2430
           REH SET PLUGBOARD ROUTINE
           REM
 2440
            HOME : PRINT "SETTING PLUGBOARD": PRINT
           MOME : PRINT "SETTING PLUBBOARD": PRINT
LET LDS = 0:J = 28:OLD = 0
PRINT "DISPLAY REMAINING CHARS ? Y/N-->";
LET MODE = 3: GOSUB :5:0: REM IMPUT A CHAR
IF A$ < > "Y" AND (A$ < > "") THEN PRINT (
LET YFLAG = 0: IF A$ = "Y" THEN LET YFLAG = 1
PRINT A$: PRINT
FOR k = 1 TO 28
IF PBD(K) ( > 0 THEN 2600
LET OUT = K: GOSUB 2330: REM RECOVER CHAR
PRINT B$:" SMOPE MITN -->":
2450
2460
 2478
2480
2490
2500
                                                                                      PRINT CHR# (7);1 8010 2478
 2518
 2520
 2538
           LET MOTE "KE GOSUB 2538: MEH NECOVER CHAR

PRINT BS;" SMAPS WITH "-->";

LET MODE = 2: GOSUB 1518: REM INPUT A CHAR

IF AS = B$ THEN PBD(K) = K; BOTO 2688

GOSUB 1788: REM CONVERT A CHAR

IF PBD(PTR) < > 0 THEN PRINT CHR$ (7);: BOTO 2558

LET PBD(PTR) = K; LET PBD(K) = PTR; LET LDS = LDS + 1
2548
2558
2568
 2578
2586
2598
 2618
           IF LDS = DLD THEN PRINT : GOTO 2640
LET Si$ = " ( ": IF LDS > 2 THEN SI$ = SI$ + " "
PRINT SI$:12 - LDS;" LEADS LEFT ) "
 2628
```

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out that I took the liberty, when writing the Enigma simulation program (Fig 1), of incorporating an 'improvement'. I have included a space character, for which I have used the asterisk (*). As the Enigma requires an even number of characters I have also included the @ character. This character is not used in the program, but it could be used as a control character to toggle boldfact printing or to indicate that the characters following it are to be interpreted as numbers — that is, characters A to J = 1 to 0. From now on, all figures stated in this article will refer to a 28-character Enigma.

Military Enigma

The first step taken to render Enigma suitable for military use was to make the rotors interchangeable and to increase the stock of rotors from three to five. Although only three rotors could be used at any one time, this multiplied the number of configurations by 60. Even with our non-standard 28-character Enigma, this only gives 1,317,120 configurations, which is still not sufficient.

The next modification was really significant, — the incorporation of a plugboard. The plugboard contained sockets corresponding to each of the characters used; by inserting a cable between two characters on the plugboard, those two characters would be swapped both before and after passing through the rotors.

An example of the effect of this modification is that if the swappings (A,X) (J,Y) were used and the A character were enciphered, the effect would be as follows: the A is first transformed into X, the X is then passed through the rotors being transformed into, say, Y, which is finally passed through the plugboard to give J. The point to note is that A becomes X also means X becomes A, thereby preserving the self-inverse property of the machine.

In the early use of the plugboard by the German military, up to seven swappings were used; this was later increased to 10. The program in Fig 1 allows up to 12 swappings. The number of ways of swapping 12 pairs of numbers out of 28 is a surprisingly large 647,489,408, 200,000, and is evident that when this number is multiplied by the million-plus configurations of the rotors, the result is a number large enough to render the machine reasonably secure.

A final point concerning the military Enigma is that in order to set the rotors to a given starting position, it was necessary for the rotors to be marked in some way. On the civilian machine they were marked on the outside with

```
Continued
        IF LDS = 12 THEN J = K1K = 28
LET OLD = LDS
2650
2660
         IF YFLAG = 8 THEN 2688
 2678
         GOSUB 2848: REM DISPLAY REMAINDER
2680
2690
         MEST
         TF J = 28 THEN 2768
FOR OUT = J + 1 TO 28
IF PBD(OUT) < > 8 THEN 2758
LET PBD(OUT) = OUT
 2786
2710
2720
2738
2740
         BOSUM 2350; REM RECOVER A CHAR
PRINT 80;" SHAPS WITH "; 80
2758
2768
2768
2778
         LET MODE = 4: GOSUB 1518: REM
                                                        IMPUT A CHAR
         RETURN
2798
2798
         REN PASS THRO PLUSBOARD ROUTINE
 2000
2810
          REM
          FOR J - LO TO HI
          LET PTR = AZ(J): LET AZ(J) = FBD(PTR)
 2838
2848
          MEXT
          RETURN
 2868
2878
          REM DISPLAY REMAINDER ROUTINE
          REM
         REM
LET VP = PEEK (37): VTAB 23
FOR OUT = 1 TO 28
IF PBD(OUT) = 8 THEN 2928
INVERSE: PRINT " "; NORMAL: (
BOBUB 2358: REM RECOVER A CHAR
PRINT 80;
 2890
 2986
 2918
                                                       : GOTO 2948
 2928
2938
2948
          MEXT
 2950
2960
          PRINT
          VTAB VP + 1
 2978
2986
2998
          RETURN
          REN
                   RESET ROTORS ROUTINE
          MEN
         IF N1 = T1 THEN 3850
GOSUB 1380: REH INCREMENT ROTOR 1
 3010
3020
3030
          LET N1 = N1 + 1: IF N1 = 29 THEN N1 = 1
 3848
3858
3868
          BOTO 3816
         IF N2 = T2 THEN 3898
G08UB 1378; REM INCREMENT ROTOR 2
LET N2 = N2 + 1; IF N2 = 29 THEN N2 = 1
 3078
3090
3090
          8070 3850
          IF N3 = T3 THEN 3138
808UB 1448: REM INCREMENT ROTOR 3
 3100
          LET N3 = N3 + 1: IF N3 = 29 THEN N3 = 1
 3120
3130
          BOTO 3898
          RETURN
 3150
          REM SET RINGS ROUTINE
 3168
          REM
          HOME : PRINT "SETTING RINGS": PRINT
         LET N1 = 1:N2 = 1:N3 = 1
FOR L = 1 TO 3
ON L 80TO 3218,3228,3238
 3180
 3198
         PRINT "ROTOR 1 CORE POSTN 1 SET TO -->":: GOTG 3240
PRINT "ROTOR 2 CORE POSTN 1 SET TO -->":: GOTG 3240
PRINT "ROTOR 3 CORE POSTN 1 SET TO -->":
 3210
 3226
          LET MODE = 2: GOSUB 1510: REM INPUT A CHAP
PRINT AS: PRINT
BOSUB 1780: REM CONVERT A CHAR
 3240
 3258
 3266
 3278
          LET B(L) = PTR
 3298
3298
          NEXT
          LET MODE = 4: GOSUB 1518: REM
                                                           INFUT A CHAR
 3300
          REM
          BOSUB 3348: REM POSITION RINGS
 3318
 3320
          RETURN
 3330
3340
3350
          REM POSITION RINGS ROUTINE
 3368
3370
3390
          HOME : FLASH : PRINT "STANDBY POSITIONING RINGS": NORMAL
         FOR L = 1 TO 3
IF B(L) = 1 THEN 3478
         FOR J = 1 TO 29 - B(L)
ON L 808UB 1388,1378,1448: REH INCREMENT ROTORS
 3410
          MEXT
 3420
          LET TEMP = 30 - B(L)
 3430
3440
3450
          ON L 80TO 3448,3458,3468
         LET N1 = TEMP: 80T0 3478
LET N2 = TEMP: 80T0 3478
         LET N3 = TEMP
 3478
3488
          NEXT
         LET T1 = N1:T2 = N2:T3 = N3
          METURN
 3500
3510
         REN
                   INPUT TEXT ROUTINE
 3520
          REM
 3530
3540
3550
          HOME
         PRINT "ENTER TEXT OF MESSAGE": PRINT
IF RFLAG = 1 THEN LO = HI + 1: 80TO 3578
LET HI = 8:LO = 1
          LET RFLAG - 0
```

: [] 5 [] [

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characters which could be viewed through windows on the top of the machine. On the military Enigma a further complication was incorporated: each rotor was fitted with a ring marked with 28 characters which, before the rotor was inserted into the machine, could be set so that any character on the ring was equal to a marked core position. This does not increase the actual number of configurations, but it does mean that even if the rotor settings used are known, this does not give away the core positions which are what matter.

Indicators

In order for the Enigma to be used, a system must be devised in order that a person receiving a message knows how to set up his machine to decode the message. One way of doing this would be to issue written instructions to each cipher clerk, detailing in full the machine setting to be used on any particular day. The problem with this is that every message transmitted on a given day will use exactly the same setting, which means that if a particular message needs to be transmitted to, say, all units on the Western Front, then the opposition, receiving numerous intercepts of the same message, would assume that something big was happening and put all its Western Front units on full alert. To avoid this, it is necessary for the cipher clerk to choose a part of the machine setting himself but, in order to do this, a system must be devised to transmit the setting used as part of the transmission; the part of a transmission which is used to indicate how to decode a message is called an indicator.

The actual indicator system used by the Germans in the early days was that the plugboard settings, rotors used and ring settings were laid down in written instructions for the day. In addition, a base rotor position would be included. The cipher clerk would set up the machine according to the laid-down base position (for example, K,M,O), and decide which rotor position would be used to transmit the message (for example, W.E.Q). He would then encipher WEQ twice over, with rotors on the base setting to give, say, JDYFIR, and these six letters would be used as a prefix to the actual message which would be enciphered after the rotors were reset to W,E,Q. The weakness of this system was the element of repetition which mathematicians could exploit to crack the messages.

A later indicator system allowed the cipher clerk to choose the base rotor setting as well as the actual rotor setting. The base rotor setting was then

```
Continued
         LET HODE = 3: 808UB 1518: REH
         LET MODE = 3: 808UB 1518: REM INPUT A CHAR
IF A6 < > CHRS (8) THEN 362B
IF HI < LO THEN 358B
PRINT CHRS (8); " "; CHRS (8);:HI = HI - 1: 80TO 358B
IF A6 = CHRS (27) THEN 369B
IF A6 = CHRS (16) THEN PRINT "";: 80TO 358B
IF A6 = CHRS (16) THEN 369B
80BUB 178B: REM CONVERT CHAR
LET HI = HI + 1: LET AX(HI) = PTR: PRINT A5;
IF CTR = 1 THEN LO = LO + 1: REM PLAIN TEXT
IF HI < > N THEN 358B
                                                               INPUT A CHAR
3570
3415
3628
3638
3648
3658
3668
3440
3470
3400
3470
3700
3710
          PRINT
          IF HI < > N THEN 3738
PRINT CHRS (7): PRINT "BUFFER FULL"
3718
3728
3738
3748
3758
3758
          LET HODE = 4: 80848 1518: REH
          RETURN
          MEN
                BET ROTORS ROUTINE
          -
          IF RPLAS = 1 THEN GOOUD 2990: REH
3770
                                                                        REBET ROTORS
          HOME : PRINT "SETTIMS ROTORS": PRINT
3788
         MOME: PRINT "SETTING ROTORS": PRINT
FOR L = 1 TO 3
ON L SOTO 3010,3828,3830
PRINT "ROTOR 1 SET TO -->"1: 80TO 3846
PRINT "ROTOR 2 SET TO -->"1: 80TO 3846
PRINT "ROTOR 3 SET TO -->"1: 80TO 3846
PRINT "ROTOR 3 SET TO -->"1: 80TO 3846
PRINT AS: PRINT
80SUB 1786: REM CONVERT A CHAR
LET B(L) = PTR
3798
3886
3818
3828
3839
3846
3846
3856
3858
3868
3878
3888
3899
3788
3918
3928
          LET B(L) = PTR
          NEXT
          LET HODE = 4: BOSUB 1518: REM | BOSUB 3938: REM | POSITION ROTORS RETURN
                                                                INPUT A CHAR
3938
3948
          REM FOSITION ROTORS ROUTINE
          REM
 3950
          HOME : FLASH : PRINT "STANDBY POSITIONING ROTORS": NORMAL
3968
3979
          FOR L = 1 TO 3
IF B(L) = 1 THEN 4070
          TF SIL) = 1 (NEW 1978)
FOR J = 1 TO B(L) - 1
ON L GOSUB 1380,1370,1440: REM INCREMENT ROTOR
ON L GOTO 4010,4030,4050
LET N1 = N1 + 1: IF N1 = 29 THEN N1 = 1
3988
3998
4888
4010
4829
          GOTO 4868
4030
4040
          LET N2 = N2 + 1: IF N2 = 29 THEN N2 = 1
          GOTO 4868
          LET N3 = N3 + 1: IF N3 = 29 THEN N3 = 1
4868
4878
4886
4898
          NEXT
          NEXT
          RETURN
          REH
                    SELECT ROTORS ROUTINE
4100
          REM
4110
4129
4130
          HOME : PRINT "SELECTING ROTORS": PRINT
          FOR L = 1 TO 3
ON L GOTO 4158,4168,4178
4140
4150
          PRINT "ROTOR 1 IS -->";; GOTO 4188
PRINT "ROTOR 2 IS -->";; GOTO 4188
PRINT "ROTOR 3 IS -->";
4169
4180
          GOSUB 4260: REM INPUT ROTOR
4190
          PRINT AS: PRINT
4200
          NEXT
          LET MODE = 4: GOBUB 1518: REM INPUT A CHAR
HOME: FLASH: PRINT "STANDBY INSTALLING ROTORS": NORMAL
4210
4229
                                       INSTALL ROTORS
4238
          GOSUB 4388; REM
4248
          RETURN
4256
4268
4278
          REM
                    INPUT ROTOR ROUTINE
          REM
4280
          LET HODE = 1: GOSUB 1510: REM INPUT A CHAR
         GOSUB 1788: REM CONVERT A CHAR
ON L GOTO 4319,4328,4348
LET B(L) = PTR: GOTO 4368
4298
4388
4318
4320
4330
          IF PTR = B(1) THEN PRINT
                                                       CHR# (7);: GOTO 4288
          LET B(L) = PTR: GOTO 4368
4340
          IF (PTR = B(1)) OR (PTR = B(2)) THEN PRINT CHR$ (7):: GOTD 4298
4358
4368
          LET B(L) . PTR
          RETURN
4370
          REM
4380
4390
                    INSTALL ROTORS ROUTINE
          REM
         REM
          FOR K = 1 TO 28: READ REF (K): NEXT
4418
4428
          FOR L = 1 TO 5
         LET DFLAG = 1
4430
         FOR J = 1 TO 3
IF B(J) < > L
                             L THEN 4468
4440
4450
          LET DFLAG . 0: GOSUB 4510: REM FIT ROTOR
4468
          NEXT
4478
          IF DFLAG = 1 THEN GOSUB 4610: REM DISCARD DATA
4480
          MEXT
4498
          RETURN
4518
          REM FIT ROTOR ROUTINE
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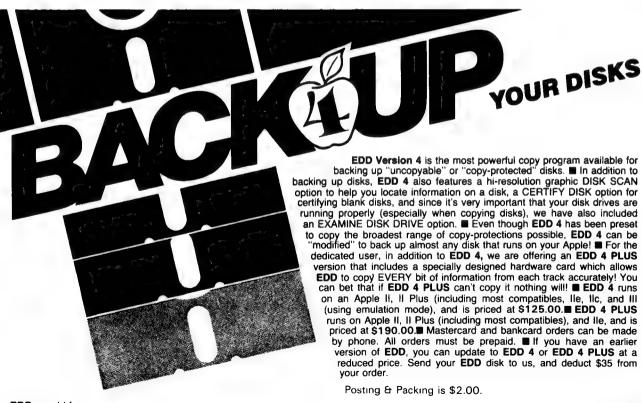
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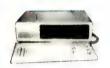
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```
Continued
4520
            FOR K = 1 TO 28
ON J GOTO 4558,4568,4578
READ R1(K): GOTO 4588
4548
4558
             READ R2(K): GOTO 4588
4570
            READ R3(K)
4580
4590
            NEXT
            RETURN
            REM DICARD DATA ROUTINE
4618
4620
4630
             FOR K = 1 TO 28: READ DUMMY: NEXT
             RETURN
                       DATA FOR REFLECTOR WIRING
            DATA
DATA
REH I
                       23,19,28,14,15,22,11,12,21,24,7,8,17
4,5,25,13,26,2,3,9,6,1,18,16,18,28,27
DATA FOR ROTOR A WIRING
4485
            REM DATA FOR ROTOR A WIRING DATA 26,23,9,28,15,19,4,16,6,12,28,21,22 DATA 14,1,25,18,27,13,17,24,3,2,11,7,18,5,8 REM DATA FOR ROTOR B WIRING DATA 8,18,5,15,15,15,14,49,28,17,26,12,11,14,24 DATA 22,16,2,19,23,21,27,6,28,7,3,18 REM DATA FOR ROTOR C WIRING DATA 12,23,19,7,2,24,1,27,22,14,5,9,15,18,8
4690
4700
4718
4720
4738
4748
4750
                          21,11,4,13,16,29,18,6,26,17,29,25,3
             DATA
            REP: DATA FOR ROTOR D WIRTING
DATA 13,5,27,9,15,1,18,18,14,19,12,3,24,2,7
DATA 11,4,22,21,28,23,25,26,28,6,17,8,16
REP: DATA FOR ROTOR E WIRTING
4778
4818
             DATA
                       19,7,14,16,3,25,12,19,28,1,18,24,6,26,17
21,22,8,23,11,2,27,4,13,9,15,5,28
```

transmitted as plain text at the start of the message, which would give, using the example quoted in the previous paragraph, the nine-letter indicator KMOJDYFIR. The base rotor positions could be transmitted in plain text because, as stated earlier, a knowledge of the rotor settings is useless unless the ring settings in use are known.

If any reader wishes to use the program in Fig 1 to send cipher messages, I would recommend the second system but without the repetition, giving a six-letter indicator.

Good ciphering

Ideally, you should doubly encipher all messages. At the start of a message, include a random amount of garbage

characters and break up long words using an infrequently-used character. Avoid using stock phrases, particularly at the start of a message. It is easy to fall into the trap of thinking that a cipher system is so good that you can start all messages 'From Officer Commanding . . . ', but no cipher is that good except for the one time pad method, and even then no good cipher clerk would use it.

If you were to use an indicator system, you should change the system occasionally; perhaps every three months a simple change such as adding a couple of dummy characters before the indicator would be sufficient.

Using the program

When you boot the program disk, you

PLAIN TEXT

AS*TODAY*IS*OUR*BELOVED*LEADERS*BIRTHDAY*ALL*TROOPS*WILL*BE*

ISSUED#EXTRA#RATIONS

CIPHER TEXT

CPEXSWHCK@N@LE+XZPR@##VNIOLUFXXXQKKSGPEQLZ#BQHAYBUQKKHTNRXMB

VDGRDHBGLEWPBJZXKBTD

Fig 2 The 'challenge' text

Fig 3 The letter 'A' enciphered repeatedly 1000 times



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will have to set the plugboard. You will be presented with a prompt such as 'A SWAPS WITH—>', to which you reply with a character (A to Z or * or @) - note that A swaps with A means that the plugboard socket is not used. An option is provided to display the remaining characters, which is handy when you are experimenting with the program but it does slow entry speed.

After you have set the plugboard, your next job is to select the rotors. The five rotors are designated with the characters A to E, and the position of the rotors in the machine is determined by the order in which you enter them. Entering A.C.E. for example, would mean that the outermost rotor is A, the middle rotor C and the innermost rotor E.

Next, you set the ring position corresponding to core position one for each rotor by entering one of the aforementioned 28 characters. A similar procedure is necessary to enter the rotor settings to be used, and this completes the setting up of the machine's initial configuration.

You can now enter the text of the message. If you want to transmit plain text as part of an indicator system at the start of the message, this can be toggled using CTRL-P and is indicated on the display by single quotes. Another feature intended for use with indicator systems is the facility to reset the rotors during a message; this is done using CTRL-R. Pressing the space bar generates the * character, and characters may be deleted using the backspace arrow. When you have finished entering the message, you press the Escape key and the machine will encipher the message. Output from the machine can be sent to the screen display or to a printer.

At all times, when using the program, the Escape key is used to move on to the next part of the program, and CTRL-A can be used to abort the program.

I have written the program in (Applesoft) Basic as this is a language that most people are familiar with, and as a result the program runs quite slowly. It takes over 0.6 of a second to encipher each character, which is certainly better than could have been achieved with the original Enigma, although it seems very slow by modern standards.

If you want to use the machine for serious cipher work, a speed increase could be obtained in two ways. The program's bottleneck is in the increment rotors routines between lines 1300 and 1490. If you are familiar with the method used to store arrays on your micro, it would be a straightforward task to write a machine language subroutine to perform this function and call it from Basic. An alternative would be to rewrite the entire program in a more suitable language. If I were to rewrite the program I would use Forth, as that language is particularly well suited to this application.

Conclusion

Here's a challenge: it's the 'easy' one of determining the machine configuration used to encipher a piece of text, given the cipher text and the plain text. This may seem an unreal problem, but it's a situation that often occurs in the real world: for example, it is decided that a certain message is harmless and can be transmitted in plain text, but someone enciphers it. If the opposition can find from this the machine setting used, then the entire cipher traffic for that day would be compromised. The 'challenge' text is shown in Fig 2.

Bibliography

I would recommend readers to study:

- How Polish Mathematicians Deciphered the Enigma by Reiewski:
- Annals of the History of Computing 3 (1981) by Gordon Welchman:
- The Hut Six Story (McGraw Hill 1982); and
- Alan Turing, the Engima of Intelligence by Andrew Hodges (Burnett Books 1983 and now available in paperback, published by Unwin Paperbacks)

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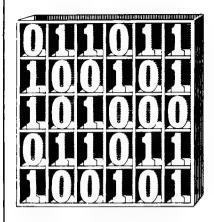
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COMMENT CASE CONVERTER

Just one Datasheet this month — MC/LCASE, from Russell Greene.

Russell's low-level work is mainly carried out in 8085 code on a Superbrain, using Digital Research's Mac assembler. For some obscure historical reason, probably harking back to the days of desk-size terminals, this otherwise sophisticated software writes all .PRN file comments in upper case — acceptable for short listings, but abominably tiring to read over several pages.

MC/LCASE is a complete program to re-convert the contents of the .PRN file comment field to lower case. except those strings preceded by a special userdefined character. The program has three main sections which (a) read the original file to memory; (b) convert the file in memory; and (c) write the converted file back to disk. Russell has also programmed in error check sequences which abandon the operation and perform a warm restart on disk read or write error.

MC/LCASE is unusual for SubSet in several aspects. It is a complete program and not just a library subroutine, which is perhaps a welcome change as even the best general-purpose routines can be virtually meaningless when seen in Datasheet

isolation and not as part of a working program. It is not designed for the whole range of 8085/Z80 computers but written specifically for one system, to deal with a perceived fault in that system's implemented software, and makes full use of system calls. Is it adaptable for other computers built around the 8080 type chip, or, indeed, other processors? It employs both macro and conditional assembly techniques, neither of which can be used in an environment which calls up preassembled (machine code) routines. Both of these software tools are all too often unavailable on less expensive assemblers. How useful are they?

Read/write

Disk access is not an intrinsic part of the conversion process, and the read/write sections of MC/ LCASE can, of course, be used in any program operating on disk files. The .PRN file which MC/LCASE converts is read from and written to disk by the operating system BDOS the program supplying the correct parameters in system calls. All the necessary parameters are assigned in equate statements at the start of the program.

Conversion of the read and write sections for other disk operating systems should be quite straightforward. In some cases, only the values equated to the DOS function codes and system constants will need changing.

As the complete file is read in before conversion starts, there should be little difficulty in adapting MC/LCASE to single-tape storage systems.

The straightforward method of load-file, processfile, store-file keeps the programming logic simple and the program short, but could produce problems if the object file were large. Disk storage usually exceeds RAM space, and some assemblers work directly to disk to prevent unnecessary limitation of object program size. (Remember that a full source line reduces to only two or three bytes of object code.) MC/LCASE does not check for a large file overrunning available free memory and eating into system code. Rewriting the program to convert only one or two sectors' worth of listing at a time could prove tricky to code due to split lines, but might be effort well spent if you often work with large source files.

Structure

Ideally, the disk operation and actual file-in-memory conversion sections of the program would be written as separate subroutines, each filed in your subroutine library with distinct Datasheet documentation.

With only minimal rewriting, the conversion section could be further structured to provide several routines, all of which would be useful in any text editing program. Three spring immediately to mind: one to return the start address of

each new line; a second which searches for a specific character (in this case ';'); and a third which changes case. Of course, introducing generality in this way always results in longer, slower programs.

Macros

Those of you without a macro assembler will be rather envious of the labour saving made possible by the ability to repeatedly generate sections of code by merely typing in the macro name. I see the greatest benefit as the structure and readability automatically imposed by the (judicious) use of macros - on the source program at least. There are one or two other parts of MC/LCASE that would benefit from macroisation, such as the initialisation of the file control block at addresses 0174 and 0229.

Macros are often much like subroutines in that they can be tested in isolation, quaranteed to work correctly, and stored in a library for use in any program. Where they differ from the type of routine normally found in SubSet is that the assembler will generate code for every occurrence of the macro name. However, by using conditional assembly techniques, it is possible to design a macro that is actually little more than a subroutine call but with greater source program readability.

Once defined, macros become part of an extended instruction set acting on a

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merged processor and system. The ultimate possibility afforded by a macro assembler is the creation of a complete compiled highlevel language. This is limited by the assembler's source program format, but has the facility of inserting low-level instructions anywhere without degradation of performance.

Conditional assembly
Although conditional
assembly is a useful tool, it
can be anathema. The
current state of the conditional variable must be
known to determine whether
the section will be assembled or not; this can often
mean checking back several
pages to find the last
directive which affected the
variable

In MC/LCASE, the subroutine PRINSUB is a necessary adjunct to the macro PRINT, and obviously has to be stored with it in the macro library. Nevertheless, it must be assembled just once in the program as opposed to the rest of the macro code, which is inserted at each occurrence of PRINT. This is achieved by setting a flag (PRINT-FLAG) within the conditional section to prevent further inclusion after the first PRINT. The problem with this method is that the conditional assembly flag used has to be initialised in the program and not inside the macro, so the macro cannot be entirely transparent to the host program. PRINT then only saves the value in DE, loads it with the address of the embedded message and calls PRINT-SUB: this in turn saves registers and calls the system's print routine.

The conversion

As you can see, the Datasheet listing is not the normal SubSet non-specific format but an actual converted .PRN file listing to show the effect of the program. This form of self-reference was also used in APC, November 1984 with a BBC listing of the BBC assembler formatter, LSTFMT.

MC/LCASE will convert only alphabetic characters from upper to lower case, and only those following the comment field semicolon (;) symbol. All preceding characters in the label, mnemonic and operand fields are unaffected. Full line comments are also unaffected if the asterisk (*) symbol is used initially.

An override symbol, the apostrophe or single quote ('), may be used to prevent selected words (register names, labels, and so on) being converted. In this case a word terminates with a space, so multi-word strings can be selected by one override symbol, provided the word delimeters are not spaces. Two good examples of this facility are in the REG USE section, where the register names are separated only by commas, and throughout the header documentation where TAB characters (not spaces)

separate the section title and the first word of information.

The program does suffer some minor problems. Wherever an apostrophe appears in a comment word, all succeeding letters are left in upper case (as the word 'doesn'T' in the ERRORS section).

The use of the character ';' instead of the ASCII value 03BH in the equate COM-CHAR line, also fools the program into thinking that the comment starts in the middle of the operand field. The following single quote used to identify an ASCII character is taken as the override symbol and, as only a TAB character separates it and the real comment field, the first comment word

remains in upper case.

The override symbol could, of course, be any character, and only the value assigned in the LITCHAR EQU line need be changed. Russell suggests the possibility of using an 'invisible' control code, but recognises that it could cause display problems on different computers.

CP/M Users' Group
Russell is a member of a
CP/M users' group, and
intends donating a version of
this program as a .COM file
to the group library. There is
a slight difference in the
result file of the new version
— the single quote is
replaced by a space, so
watch out for semicolons in
the operand field.

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0000 = CR EGL 00H 0000 = LF EGL 0AH 0039 = CONCHAR EGU ';' ; CONMENT flag.	
### LITCHAR EQU 27H juser defined flag to justrings to be left u	identify /came.
BOIA = EDF EQU 1AM pend-of-file(^z).	
jaystem constants — may be redefined for users system	
######################################	'JMP.
<pre>005C = FCB1 EQU 05CH ;default file control</pre>	block.
8100 = TPA EQU 188H 'RAM programs base. 8800 = SECLEN EQU 128 bytes per physical s	ector.
'BOOK functions.	
BOOT - PRINTLIN EQU 9 print string.	
BOOF = OPENF EQU 15 gopen file. OB18 = CLOSEF EQU 16 gclose file.	
9814 = BEORD EQU 28 sequential read sect 9815 = BEORRT EQU 21 sequential write sec	or. tor.
881A - SETDMA EQU 26 1set 'DMA	
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signan	_
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816E 23 INX H this will trap error	
B16F 3652 MVI M, 'R' jas well as save offs	rt.
814F 3452 MVI H, 'R' jas well as save effo 8171 23 INK H 8172 3446 MVI H, 'N'	
916F 3452 MVI H, "F" jes well as save effo 9171 23 INK H 9172 344E MVI H, "N' 9174 AF XM e sinitialize FDS for	
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### 1	error seesage. ter to fiter prog. cone sector ERO=OK read. so start praion. y I sector ttor. pain',CR,LF; as possible.
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### 13632	error seesage. ter to fiter prog. ter to fiter prog. so start resion. y i sector tor. gain',CR,LF; as possible. and not
### 1	error seesage. ter to fiter prog. ter to fiter prog. so start resion. y i sector tor. gain',CR,LF; as possible. and not
### 14523	opening error sessage. ter to viter prog. ter to so start resion. y 1 sector tor. pain',CR,LF) as possible. and not secrypointer. n loop).
### ### ### ### ### ### ### ### ### ##	opening error evesage. ter to fiter prog. ter to fiter prog. cons sector ERO=OK read. so start resion. y I sector tor. pain',CR,LF; as possible. and not sory. rpointer. n loop). te to 'A. sick to disc.



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01EC C2E201	1	JNZ	OP.	jif not, move along line.
	jbeginni i	ng of co	pement.	
01EF CD1C02 01F2 FE0D		CALL	RCH? CR	(dont need to process ";") pend of line?
81F4 CAE281		JZ	OP .	gif so, jump to new line.
81F7 FE27 81F9 C28C82		CPI JNZ	LITCHAR TXLT	iflagged to leave as u/case? iif not, convert.
	•		eft in u/case.	
	1	CALL.	RCH?	search for end (space) of
B1FC CD1CB2 B1FF FE2B		CPI	SPACE	istring being left unchanged.
8281 CAEF81 8284 FESD		JZ CPI	COM CR	gif end, try next character. gif not, end of line anyway?
8286 CAE281		JZ	OP .	gif line end, jump to new line.
8289 C3FC01		JHP	LIT	jelse continue wearch.
	convert	to 1/c	450.	
626 C FE41	TXLT1	CPI	'A'	gif less than 'A
020E DAEF01 0211 FES0		JC CPI	COH 12 1+1	
@213 D2EF@1		JNC	COM	ident convert.
8216 C628 8218 77		AD I HOV	BPACE H,A	convert u/case to 1/case. replace converted byte.
8219 C3EF81		JHP	COM	Inext byte.
	local	empt on.	tine to incremen	t pointer and load byte to reg'A
6 51C 52	RCH?	INX	н	;next address.
021D 7E 021E C9		NOV RET	A,H	iread byte to 'A.
	i impite (ile bac	k to diec.	
	i WRITFILE			
821F 21A482 8222 229482		LXI SHLD	H,DMSTART DMPOINT	preset pointer to start.
8225 3A7C88		LDA	FC91+32	precord (=sector) count.
8228 47 8229 AF		HOV XRA	B,A	seve it. re-initialize FCB-COUNTERS.
822A 724888		STA	FCB1+12	Tra-Initializa FES-COORTERG.
8220 327C88		STA	FCB1+32	
8238 C5	WRITLOOF	PUSH		jetack record count.
8231 ZA9682		LHLD	DHPGINT	iget 'DMA
0234 EB 0235 0E1A		HVI XCHB	C, BETDMA	gin 'DE gmet 'DMA
0237 CD0500		CALL	9DOS	,
	perite			
923A: 1150	•	LXI	D,FCB1	
023D 0E15		HVI CALL	C, BEGWRT	jurite a sector.
8242 C1		POP	3	,pop record count before jumps.
0243 B7 0244 C25102		ORA JNZ	A MRITERR	itest for write error if 'A not zero.
8247 85		DCR	•	count off one record
8248 CA6882 8248 CD8782		JZ CALL	CLOSE INCOMA	jand wind up if finished. jelse bump pointer
824E C33 88 2		JHP	MRITLOOP	and continue.
	error-o	n-write		
8251	WRITERR		KCR,LF,'Diec fu	11'>
8268 C3 8888	1	JHP		j qui t.
	jwind it	all up	officially.	
0268 115086 026E BE18	CL08E:	HVI	D,FCB1 C,CLOSEF	jupdate disc 'FCB.
6276 CD6586		CALL	BOOR	
0 273		PRINT	OK .	; signal success'
8282 2A9882 8285 F9		SPHL	INSTK	prestore system stack
8296 C9		RET		pand exit to 'CCP (hoping file phasn'T overwritten it).
	1			M pointer by one physical sector
	1		D	as position by one privated and on
0287 D5 0298 E5 0289 2A9682	INCOMA	PUBH	H	
8289 2A9682 828C 118888		LHLD	DMPOINT D,SECLEN	pick up last 'DMA sand sector byte length
020F 19		DAD	DHPOINT	calculate next sector address and save it.
8298 229682 8293 E1		BHLD POP	H	;and save it.
8294 D1 8295 C9		POP	D	
	i local		orage.	
	DHPOINT			1'DMA pointer.
	DESCUINT	DN DB	•	•
8296 8000	1		2	Isystem stack pointer saved her
8276 8888 8278 827A	INSTKI	D6	10	local stack.
0270	INSTKI LOCLSTK DHSTART	D6 EQU	*	

WRINKLES

Steven Weller is rather dissatisfied with the way the 68000 returns a 32-bit product for a 16-bit by 16-bit signed multiplication.

Suppose you want a 16bit result? How can you check for 16-bit signed overflow? He suggests using the code fragment shown in Fig 1.

Is this method good? It is eight bytes long and does use an extra 32-bit register, so is there a better way?

G Lattin likes the Z80's register indirect conditional jumps. What register indirect conditional jumps, you might ask? They are three bytes long, take 22 time states to



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jump, 26 not to jump, and use a couple of stack bytes in the process. Most

assemblers will only recognise the form similar to that shown in Fig 2.

: **==============** JZDE PUSH DE **D5** Z RET **C8** PNP DF D1 JPOBC PUSH BC **C5** PO RET EØ BC C1 POP and so on.. Fig 2

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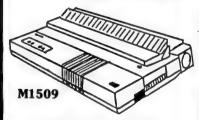
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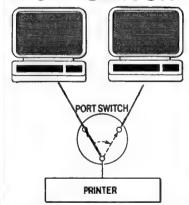


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COMMUNICATIONS

All change

Peter Tootill and Steve Withers throw some light on a subject which can cause confusion to telecomputing newcomers — the various modem standards.

The problem with using ordinary telephone lines to move data around is that the lines are not being used for the purpose for which they were designed, so the data has to be changed into sounds before it can be moved. This is the job of the modem.

There are a number of different modems available. Most of the ones you will come across are designed to comply with a set of standards set down by an international committee called the CCITT (Consultative Committee on International Telephony and Telegraphy). The standards are part of a series called the V series (which covers a range of communications matters, not just modems). The modems in common use on ordinary telephone lines are V21, V22, V22bis and V23. Modems are classified by the speed at which they send and receive data, and this is measured in bits/second. Until recently, the most common modem was a V21 (300 bits/sec) type. This transmits and receives data at 300 bits/sec, which is characters per second (each character requires 10 bits because extra bits are added to the seven or eight used by the standard ASCII code to help the computer decide where the characters begin and end).

During the last year, dual-standard V21 and V23 modems have become popular. V23 works at 1200 bits/sec in one direction and 75 bits/sec in the other. For example, if you were to call Viatel with a V23 modem, the frames

would be sent to you at 1200 bits/sec (that is, approximately eight seconds for the whole frame). But if you were to type a request for a new page number, the number would be sent from your terminal to Viatel at 75 bits/sec (about the speed of a good typist). This is a sensible method of working for systems such as Viatel as they are doing all the work.

However, the problem with this rather unequal method (its officially called 'asymmetric') arises when you want to do more than type in a few page numbers.

For example, if you use an electronic mail system, which charges you for each minute you are connected to it, you will want to economise by reducing this time as much as possible. One way of doing this is to prepare messages beforehand, using a word processor, and transmitting them in a block to the system when you call in. This process is often referred to as 'uploading' messages, and most terminal programs include this facility.

However, at 75 bits/sec, uploading is rather slow for anything more than a few words. Both V21 and V23 modems use sounds of different frequencies to represent the binary ones and zeros in the data; this is called 'frequency shift keying' or FSK. In fact four frequencies are used, divided into two channels so that both ends of a 'conversation' can transmit at the same time, without having to wait for the other to finish.

Using frequency shift keying, you can

select a new Viatel page before the current one has been completed, or you can send a pause character (usually control-S) to tell a database to pause while you digest the contents of the screen.

Telephone lines don't have a very wide frequency range: the maximum data rate using FSK techniques on dial-up lines is around 1200 bits/sec in one direction only. Recent developments in modem technology have lead to the introduction of 'phase shift key' modulation. In this method, the phase of the signal is changed, as well as the frequency, to encode the data. This allows more than two signals to be used in each direction.

To take advantage of phase key modulation, V22 modems, which work at 1200 bits/sec, in both directions (full duplex), divide the data into pairs of bits (called 'dibits'). A little thought will reveal that there are four possible combinations of two bits, so four types of signal are needed in each direction. Each time the signal changes, two bits of the data are transmitted; therefore, if the signal changes 600 times a second, the data rate is twice this.

The latest type of modem to become widely available uses the CCITT V22bis standard; this uses 'quadbits' to send data at 2400 bits/sec but still at 600 baud. Telecom can provide modems which work at 9600 bits/sec on dial-up lines. With mainframe computer systems, where there is a need to move

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COMMUNICATIONS

large quantities of data, sophisticated high-speed modems and special lines, which are permanently rented from Telecom, are used. Speeds of many thousands, or even millions of bits per second can be achieved in this way.

System News

The sysops of The Electronic Oracle have resolved the teething problems with their 2400bps service by changing to a different brand of modem! A Dataplex DPX 224 has now been installed, and this manages to detect the speed of incoming calls quickly and correctly.

While on the subject of faster links, the price of higher-speed modems continues to puzzle us. V21/V22 modems currently cost about the same as the cheaper IBM clones with 256k and a single disk drive. The obvious answer is to point to the economies of scale involved, but as modems are built to international standards, very large production runs should be possible (remember that plug-packs can take care of power supply variations). Also, a personal computer involves much more non-silicon hardware in the way of a large case, power supply, disk drive, etc. It's hard to believe that nobody in Taiwan

or one of the other homes of cheap electronics can see the potential for a reasonably priced V22 or V22bis modem. Or do the various national telecommunications authorities make it too hard for potential importers of datacomms equipment to gain the necessary approvals?

Thanks to the following people for providing information used in the preparation of this column: Mark Looi. John Halkiadakis, Chris Whitefield, and Gravham Smith.

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Electronic mail is often presented as the epitome of fast and efficient communication. But while the rapidly increasing popularity of datacommunications is all to the good, we have, argues Surya, still got a long way to go.

Nineteen-eight-six has been heralded the Year of the Modem: electronic mail promises the end of delayed post, lost documents and 'telephone tag'. Online information databases proclaim themselves as the final solution to the need for fast, accurate information. Traditional telex terminals are a dying breed, as even a humble electronic typewriter can be adapted to send and receive telexes. Datacommunications is king.

Last year was something of a celebration period for the datacommunications industry. Electronic mail, once the preserve of large computer companies and a few enlightened individuals, is now almost a household phrase. The modem has been transformed from an expensive mainframe and minicomputer peripheral to a sub-\$200 box owned by thousands of ordinary hobbyists. In today's business micro systems, a modem is almost as essential as a printer.

And yet the datacommunications industry can ill afford to sit back and rest on its laurels. The present-day industry is a mass of confusion, inconsistency and disinformation. The very fact that datacommunications is achieving such popularity is indication enough that the time has come to make radical and widespread changes to the way in which the industry operates. The three keywords of its future must be education, standardisation and rationalisation.

Some of the changes I suggest in this article are radical: they will require reorganisation, effort and a willingness to overcome the technical difficulties. Not least, they will require financial investment. But adapting to suit the requirements changing of your customers is hardly a radical move from a marketing viewpoint: it's simple economic sense. For every inexperienced user struggling with the likes of IPSS, there are at least 10 others who have never even considered using any form of computer communications because of the perceived difficulty involved. For every online database user, there are a hundred potential users who aren't even aware of the existence of services which could be saving them time, effort and money. For every electronic mail user, there are thousands of people using antiquated telex machines simply because they believe electronic mail to be complex and uncertain. Not only are these potential comms users deterred now, but the chances are that a great many of them will remain prejudiced even after the changes have been made. The need for action is urgent.

Education

Comms is no longer the exclusive domain of the expert computer user. More and more of today's users are neither experienced nor interested in the technicalities of computing. Their requirements are straightforward: they want a service which is efficient, reliable and, above all, easy to use.

Of course, the actual ease of use of a service is only half the issue; perhaps less than half. At least equally important is the way in which the service is presented to the user. A poor advertisement, and potential customers won't even bother to pick up the phone. A muddled leaflet or brochure, and you'll never hear from them again. An incomprehensible manual, and you will hear from them again. And again!

The phrase 'computer literate' has become part of the English language. But while those outside the industry are perhaps beginning to appreciate what computers can and cannot do, comms is still shrouded in mystery, myth and muddle. While most people are aware that electronic mail is the computer equivalent of telex, few appreciate the advantages that it offers. While some are aware that Viatel is an online information service which allows them access to such information as airline timetables,

news and weather, few are aware of the vast and varied range of up-to-theminute information available in this and other information databases.

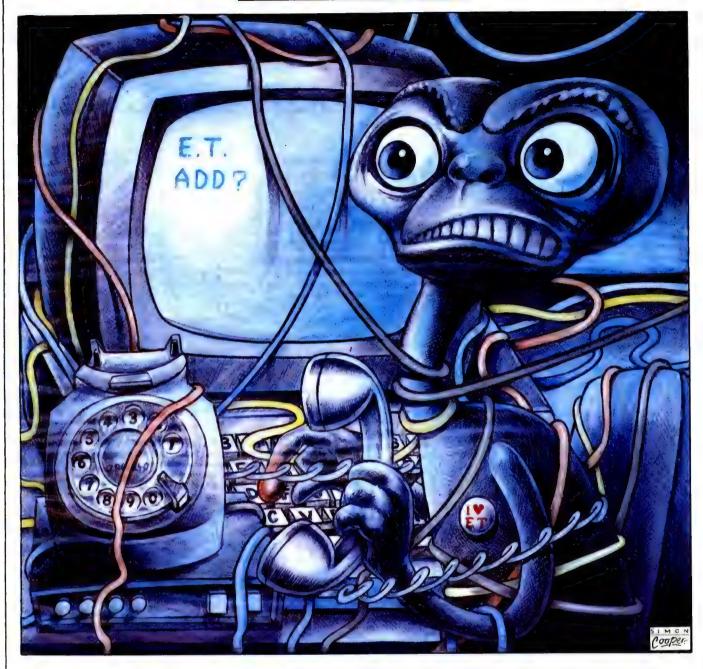
A significant part of the educative process is simply to present the public with straightforward, accurate information in a comprehensible form. That this commodity appears sadly lacking is a responsibility which must be shared by providers, software equipment suppliers, dealers and the press. In a time when the largest untapped market for datacommunications products and services is the naive computer user, advertisements, brochures and manuals for modems. communications software and online services are still being aimed at the professional comms user.

And if jargon such as 'the service is accessed at 300-baud CCITT originate, using eight data-bits, one start, two stop, even parity, Xon/Xoff handshaking with optional XModem protocols and/or EPAD error-checking' isn't enough to deter people, the prices are. And yet, used correctly, dial-up computer services are not spectacularly expensive: the problem is simply one of education.

Let's take the example of an on-line database which offers legal information. With a connect-time charge of \$120 an hour, it seems at first glance a very expensive service. But in just 10 minutes service, a lawyer or solicitor can find precedents, search for priors, check references in transcripts...all for just \$20. Compare that with the cost of sending an employee to search through volume after volume of crowded text. Think about the possible consequences of not having the information when you need it, and \$20 becomes a ludicrously insignificant figure.

Similarly, with electronic mail. A connect charge of 10¢ per minute is an expensive way to send mail if you sit online while you compose replies to your business correspondence. But log off,

COMMUNICATIONS



write your mail offline using your word processor and then log on again to transmit the completed file, and you can send a message faster than a courier for less than the cost of a stamp. If we are to encourage people to take advantage of computer communications, then education on this level is every bit as important as demystifying the jargon.

But presenting users with clear and accurate factual information is only one of the things needed to convince people that comms can work for them. Equally important is to introduce widespread and sensible standardisation.

Standardisation

complex, emotive and confused issue in the entire computer industry. The benefits, in terms of simplicity, convenience and efficient use of resources, are self-evident, and vet these have to be weighed against the equally apparent disadvantages. The microcomputer standards currently on offer are MSX for the home market, and IBM for business. Neither are anything write home about. It's uncomfortable dilemma which will doubtless be with us for a long time yet.

But standardisation of the datacommunications industry is much simpler to achieve, and presents far fewer drawbacks. There are really only Standardisation is arguably the most I three baud rates in use, for example: 300, 1200 and 1200/75. And yet one 300-baud service requires eight databits, one start and two stop with even parity and Xon/Xoff handshaking, while another demands seven data bits, one start and one stop with odd parity and Sin/Sout protocols. There's no particular gain to be had from either; they are simply arbitrary settings which could be easily changed.

Similarly with modems. The Hayes protocol, a set of standard codes by which comms software can control the settings of a modem, is a great step in the right direction, and thankfully seems to be achieving widespread acceptance. But manufacturers are still continuing to produce modems which require different signals from the computer.

COMMUNICATIONS

Tandata recently released a beautiful intelligent modem. It's completely automatic, does everything you might ask of it, has built-in memory for storing telephone numbers and is totally useless to me because it is controlled using non-standard codes. I can either throw away my existing, Hayescompatible software and buy Tandata's own package, or buy a less attractive Haves modem. A friend of mine has the opposite problem. Her auto-answer, auto-dial modem is Haves-compatible. but her auto-answer, auto-dial software isn't - as she discovered only after buying both. Consequently her system neither auto-answers nor auto-dials.

A compatible modem and software package isn't the end of it, of course. There's that most wondrous of beasts, the RS232 cable. The RS232 cable is, of course, an internationally-agreed standard. Except that we all know that it isn't. My Macintosh has a 9-pin rectangular modem socket. My Tandy 100 has a 25-pin rectangular socket. My modem has a five-pin DIN-socket.

Some machines have male plugs, others have female sockets. Some cables use nine wires, others use seven, five or three. Some carry DTR on one pin, others prefer a different pin; others don't use it at all. Some machines want DCD to be high, others need it low. Some want five volts, others insist on 12.

Creating a standard RS232 socket, cable, power requirement and wiring system is simple. Unfortunately, both CCITT and RS have published incompatible ones, and nobody uses either of them.

We must standardise. When the industry was young, and its relatively few users were quite happy with manual modems, suss-boxes and software configured by typing 1s and 0s against a list of options, a standard was a luxury to be considered in the dim and distant future, if at all, but that future has now arrived. Not only have many of today's users never heard of a suss-box, but those of us who have are becoming increasingly irritated with the frequency of its use.

There's nothing difficult about standardisation. Dial-up services could meet tomorrow to agree on standard settings and protocols for each baud rate and have it in operation the same day. Modem manufacturers and software houses could switch to the Hayes standard with their next releases Modem and micro manufacturers could adopt standard cables in future machines. It's not difficult, it's not time-consuming and it's not expensive.

Rationalisation

The dictionary definition of rationalisation is 'to make sane', and nowhere is this need greater than in the field of computer communications. Much of this task would be achieved by the kind of standardisation I have mentioned.

For the rest, just look at the many packet switching networks.

All of them operate via unintelligible prompts, cryptic diagnostics and lengthy numeric addresses. The hackers find it easy to navigate through these systems, but to potential business users, it's all too hard. Often, three levels of security, addresses and passwords must be negotiated — MIDAS, TELENET and the end service.

The rational approach is to install a front-end to the system which firstly has a more welcoming and friendlier log-on sequence, and secondly requires you to type in the name of the service you require. An alphabetical list of services can be hash-searched almost as quickly as a numeric one, and it is a simple matter to include a 'near miss' search pattern to take care of mis-spellings and similar.

Electronic mail services need to install similar front-ends to their mail programs. It's ridiculous to have to enter a mailbox number when you could enter a name. Most services offer a facility which allows you to set up your own cross-referencing file so that you can mail regular contacts by name, but this is only a partial solution.

There are problems to this approach, of course. Names are not always unique.

And we may not know whether to address mail to an individual or his company. But these problems are nothing new: they already exist, and have been overcome, in user directories. And even a \$130 bulletin board system allows me to address mail to a named user.

Online information systems, too. require reorganisation. Free-text searches, tree-style menus and page numbers all have their advantages, and all should be offered in any database system. If I want to take a look at the business software directory on Viatel, for example, I know that this begins on page 666, and typing this page number is the fastest way of getting there. If I want to check out tomorrow's weather. I'm not sure offhand which page it is on but I know that I can find it by following the 'News and Weather' menu tree. If I want to get as much information as I can on a particular species of ant, then I would have no idea where to start, so a free-text search on the name of the species would be my best hope.

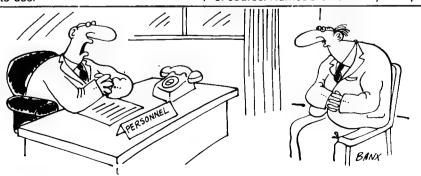
Again, there is a need for standardisation as well as rationalisation here. A free-text search is straightforward: I start with a general word such as 'ant' and then qualify it using logical operators (AND, OR, EOR, and so on) until I am left with a manageable number of entries. Or at least it would be straightforward if all databases used the same commands and syntax. They don't, of course.

Conclusion

Finally, one of the most fundamental aspects of rationalisation is to ensure that the service offered meets the requirements of its customers. Dial-up services frequently don't. We put up with their shortcomings from necessity rather than choice. Most dial-up services are in their infancy in terms of both ease-of-use and the facilities offered, and many of them bear a closer resemblance to an untidy hotch-potch of miscellaneous features.

It is not my intention to criticise what has been done in the past: rather to point out the changes which must be made in the future. Electronic mail is an excellent means of contacting people, but I can't leave the data equivalent of an answering-machine in my mailbox telling anyone who mails me that I am on holiday and won't receive their message for a fortnight.

Datacommunications has tremendous potential. But only through careful tailoring to its users' needs, can that potential be realised.



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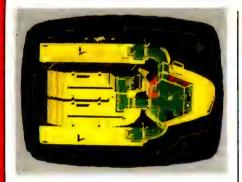
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SCREENPLAY



Our choice of leisure software this month gives you the opportunity to establish a colony in an unknown and far-flung location, and pit your wits in the arms race. Stephen Applebaum is at it again.



The burgerland adventure

GAME: Sundog: Frozen Legacy MACHINE: Atari ST

SUPPLIER: Chambers Computer

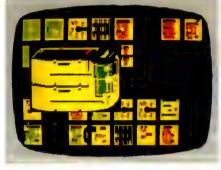
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The bizarre death of an uncle leaves you as the reluctant owner of the SunDog, a haggard, one-man space freighter. You're also the beneficiary of a contract, signed by your uncle shortly before his untimely death, promising aid for the building of a colony for a religious sect. The death of the signatory does not annul the covenant, and you find yourself in the unfortunate position of having to carry through the operation alone.

Little is known about the sect, or the whereabouts of the colony, named Banville. Your only information is that it's based somewhere on Jondd, one of 18 inhabited planets which make up the Drahew Region of the Jebal Imperial Protectorate.

Locating the colony will provide you with detailed information about the goods required to complete the con-



struction of Banville. The realisation of the town leaves only the problem of transportation of colonists to the colony.

Lack of prescience on the colonists' part has meant that they have diffused their cyrogenically-preserved bodies over the whole Drahew Region, leaving you and your ship with the almost impossible task of tracking them down and transporting them to Banville.

Much of the game's action takes place aboard the SunDog. The interior is graphically displayed in a plan view of the ship, its roof cut away to expose its complex internal workings. Your character is represented by a small stick-man, who can be guided about the craft using the ST's mouse.

Dotted around the SunDog are lockers, store rooms, entrances to engine rooms, and small compartments giving access to the craft's major control systems. Entering any one of these produces a window containing ZoomAction Graphics; in other words, an exploded view of the location into which you have walked.

Your first visit would probably be to the ship's stores to see which provisions are onboard. The locker is stuffed with beefburgers(!), reactofiles (syringes containing a panacea for wounds picked up in combat), a gun, and a shield. All these are



depicted in a box, next to which stands an enlarged outline of your character. Strategically-placed crosses adorn the silhouette, identifying areas where objects can be held or carried, and giving an acupuncturist's wallchart effect. One cross, positioned slightly above the heart, represents the spot where the content of a reactofile is administered.

Alongside the box containing the silhouette are four bars which represent various aspects of your man's condition; they indicate levels of vigour, rest, health and nourishment. These are your only guide to the health of your character, and therefore play a major role in his survival.

Below the aforementioned bars is a box containing the word 'sleep'. Just as it says, clicking on this box puts your man to sleep, restoring his rest and vigour to acceptable levels. For reasons I'll mention later, the sleep function should only be activated when you're either inside the SunDog or a hotel.

Towards the front of the SunDog is an airlock which gives access to the external environment. Although exploration on foot is possible, it is advisable to use the self-propelled pod at the rear of the craft. This acts in much the same way as a car, and allows longer periods of exploration, as you do not tire as quickly as you would if you were walking.

Leaving the main bulk of the SunDog behind, you soon find yourself amid the buildings of a major town. Like almost everything else in the game, towns are viewed aerially, giving a clear view of your pod travelling through what appear to be empty streets.

First-time visitors to a town will feel lost for a while, as none of the wierd and wonderful buildings give any indication as to their function. The only way to discover this is to park the pod and

explore on foot.

Parking should be done judiciously, as pods left anywhere other than in a podpark are switfly clamped. Release is procured on payment of a fine made at any one of several local banks. Here, you can also withdraw or deposit cash, depending on your financial requirements.

The clamp is not the only thing which planets of the Drahew Region have inherited from Earth: there is also that great social pastime, mugging. Parks, backstreets and podparks have all become arenas for the sport, making the carrying of a firearm necessary at all times.

Being mugged can leave you penniless and badly wounded, but if you're lucky, it can leave you rich. Mugging the muggers is a good way to make a fast buck, though you must make sure you're properly equipped for the task.

Battling with muggers is one of several arcade sequences in SunDog, and takes place in one of the ZoomAction windows. Before having to zap your way out of a tight spot, you are given the chance to hand over your money, refuse, or even threaten your assailants. Choose the wrong one and the game turns into a typical shoot-'em-up.

A much easier way to lose your money is to fall asleep in public. This happens quite regularly, unless you keep a keen eve on your character's condition, guiding him back to the pod or into a hotel whenever he looks as if he is about to nod off.

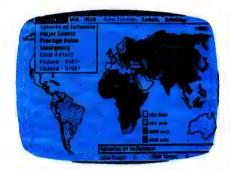
Buildings which are almost as important as the bank are the burger bars. Not only can you stock up on food here, but also chew over snippets of information elicited from other customers. And for the junkies among us, burger bars are also good places to pick up the odd drug.

With all the various places to visit in town, it's easy to lose sight of your target - the warehouse. This is the trading hub of the town, and the only building which can be entered while you're still in the pod. Inside, you have the chance to buy and sell goods picked up anywhere on the planet or even another part of the Drahew Region of planets.

Your initial search for Banville will take you out of the relative safety of town, and across the torrid dust bowls of Jondd. The journey is long, and a great deal of food is required if you are to stay alive long enough to reach your goal; the more devious the route, the less chance you have of survival.

Constructing Banville is a simple task compared to the search for the dyrogens; this enterprise takes you out across the infinite vacuum of space and into often hostile territory. Frequently you'll be attacked by enemy craft, the action taking place in a sub-Space Raiders shoot-out, the graphics of which are way below the standard of the rest of the game.

SunDog has its weak points, such as: poor scrolling as you travel across a planet's surface; the poor space combat sequence mentioned above: the improbably yet frequently-occurring event of a pod parking on top of your own, only moving when you walk off the screen and then return to your vehicle (a bug, possibly?); and a scanty, uninformative manual. Even so, its superb graphics and sound, sense of fun and space-age adventure, make SunDog a game which deserves anyone's time and attention.



If I ruled the world

GAME: Balance of Power: Geopolitics in the nuclear age MACHINE: Macintosh, IBM PC **SUPPLIER: Imagineering** PRICE: \$79.95

The possibility of nuclear war is a fear that haunts most of us. It is the thought of something so peremptory, so final, so

out of our hands, which gnaws at the back of our minds. What would you do if you were in power? Dismantle all nuclear weapons, call for a moritorium on deployment, or continue on the same nuclear merry-go-round which current world leaders seem to have found themselves on?

None of us will ever be in a position to make these decisions, but at least we can get an idea of what it would be like, by playing Chris Crawford's apocalyptic Balance of Power.

In the Options menu of Balance of Power, Crawford states: 'Your goal in this game is to increase the geopolitical prestige of your chosen superpower while avoiding a nuclear war.' As leader of either Russia or the US, it is up to you to present policies which will further the interests of your own nation, but not be so extreme as to precipitate a nuclear war. All this takes place in a world where Russia and the US are able to control the internal workings of almost any nation, these beleaguered countries being viewed only as pawns in a sick game of political chess.

Play, if you can call it that, takes place on one of four levels. For the newly-

elected leader there's a special beginner's level with its streamlined set of policies: then there's the expert and intermediate levels; and above them, a special Armaggeddon-assured nightmare level. I have confined this review to dealing with the expert level, as it contains every feature available in the game, without becoming unplayable.

Balance of Power is played on a map featuring 62 of the world's 'more important' nations. Above this map, in a menu bar across the top of the screen, are seven headings, reading: Game, Countries, USA, USSR, Make Policies, Events, and Briefing. As most of Balance of Power revolves around these seven menus, the best way to describe the game in play is to reveal the contents of the more important ones.

To be successful in Balance of Power, you have to know who your friends are. The Countries menu allows you to check this at any point in the game, by providing vital information on all nonsuperpowers. The 'Spheres of Influence' option, for example, indicates which countries are influenced by either Russia or the US. Those that are under the influence of 'the other side' should not be

SCREENPLAY

messed with, though those that are not influenced by either side could always be persuaded to come under your wing.

Also in the Countries menu is a subheading called 'Major Events'. As it suggests, this menu outlines any major events that took place during the previous year; Balance of Power encompassing eight years.

Below Major Events are five other subgroups: 'Prestige Value', 'Insurgency', 'Coup d'Etat', 'Finland-USA?' and 'Finland-USSR?' Prestige Value displays the prestige value of each country, while Insurgency presents the state of insurgency. The other three sub-groups need a little more explanation.

Coup d'état is a term used to describe the overthrow of a government through purely political means. Selecting Coup d'état? presents the likelihood that a nation's government will go through this process.

Finlandisation occurs when a nation finds itself in political and military dire straits. At the point where it could be crushed, the weaker nation adjusts its political position, making it less hostile to its would-be invader; the result is that it adopts a similar diplomatic position to

that of its enemy. Any nation which takes this path is said to have 'Finlandised'.

The menus headed USA and USSR contain information covering the two nation's policies and their relationships with the rest of the world.

Make Policies is the menu most frequently accessed in the game: it is from here that you can put your policies into operation. Military aid can be sent to different countries, help can be given to insurgencies, or you can intevene on behalf of a country's government or rebel forces.

Countries can be destabilised by sending in 'spooks'. In the case of the USA these are CIA agents, while the USSR would use its KGB.

When a player has made all the policies that he wishes to make, he opens the Game menu and clicks on 'next turn'. Before moving onto the next year, you have to go through a number of crises; these are complaints made by the opposition about your policies over the preceding year. You can challenge these, but if your adversary feels strongly enough, you may have to threaten him. Backing down at the last minute could mean a dramatic loss of prestige, while pressing 'on' can precipitate nuclear war.

What will you do?

Unfortunately, due to lack of space, this review can only be considered an outline of Balance of Power. The game is too vast and contains too much information to be covered as deeply as it could be, though I hope this short description has sufficiently whetted your appetite.

Nuclear war is a horrifying prospect which hangs over all our heads like the proverbial Sword of Damocles. Seeing the subject used as material for a computer game, therefore, makes me wonder whether it is right to trivialise such an important matter for entertainment's sake. Nothing is so ineffable that it cannot be spoken about, or at least it shouldn't be, but the belittling of such an important matter by turning it into a computer game detracts from the seriousness of the issue.

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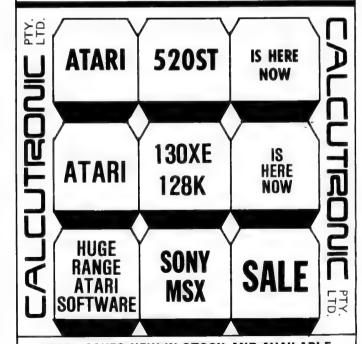
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	YES	NO	NO
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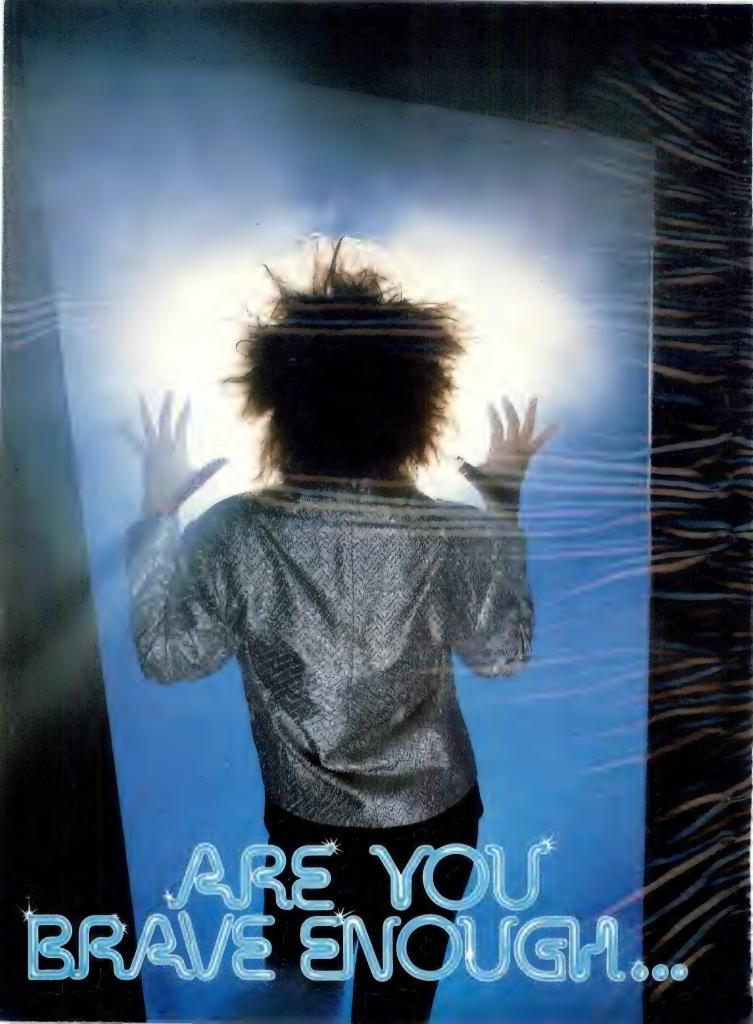
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LAZING AROUND

Brain-teasers from J J Clessa.

Quickie

No prizes, no answers, but which of the following words is the odd one out? Laughing, Mangled, Default, Thirsty, Canopy.

Prize puzzle

A certain nine-digit number is comprised of each of the digits 1-9. If the number is divided by one of the digits, it gives an eight-digit quotient which contains each of the remaining digits.

If I tell you that the original number does not end in 8, can you tell me what it

is, and what is the digit by which it must be divided to satisfy the above requirements.

Answers on postcards, please, or backs of envelopes, to reach us not later than 15 July 1986. Send your entries to Lazing Around, June Prize Puzzle, APC, 2nd Floor, 215 Clarence Street, Sydney, 2000.

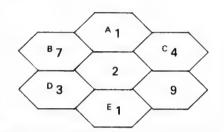
March prize puzzle

Most readers spotted the deliberate mistake in the March puzzle. Since you've all been complaining that the problems are too easy, I thought I'd slip a crafty error

into one of the clues. Keep your eyes peeled.

The winner is Mr D Wares of Beverley, WA. Congratulations, Mr Wares — your prize is on its way.

The winning solution is:



MICROCHESS

It could only happen in chess. Kevin O'Connell describes Belle's sad defeat in the 15th North American Computer Championship.

Some time ago my company was programming a game that is rather obscure and about which we had little in-house knowledge. So we hired some experts on the game and picked their brains for heuristics that our programmers could use. When the program was written and debugged, we brought the experts back to assess the program's playing ability. Occasionally the experts would ask: 'But how can it possibly make such a dreadful move?' and were never at all amused by the reply: 'Because you told the program to play like that.' It is just that dreadful rejoiner which answers the question of how Belle, world champion 1980-1983. could possibly lose the following game, having gained queen for a mere two pieces. The game was played in the 15th North American Computer Championship, San Francisco 1984.

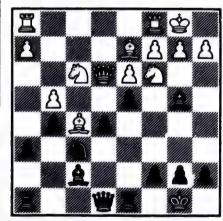
White: Belle. Black: Nuchess. Opening: Sicilian Defence.

my. ·	Jicinan Dele	HIGO.
1	e2-e4	c7-c5
2	c2-c3	e7-e6
3	d2-d4	c5xd4
4	c3xd4	d7-d5
_	D/4 10	

5 e4-e5 is better. This move loses time.

CITTO.		
6	Bd3xe4	Ng8-f6
7	Be4-c2	Nb8-c6
8	Ng1-f3	b7-b6
9	0-0	Bc8-a6
10	Rf1-e1	Bf8-b4
11	Nb1-c3	0-0
12	a2-a3	Bb4-e7

A fairly typical isolated d-pawn position, although it is very unusual to reach one from this opening — it normally arises from d-pawn openings or from the Caro-Kahn Defence (1 e2-e4 c7-c6). White has more space and some attacking possibilities; Black has the d5 square and the weakness of White's d-pawn to balance the chances.



Chessboard 1

13	Bc1-g5	Qd8-d6	
Bet	ter 13 Ra	a8-c8	
14	b2-b4	Ba6-c4	
15	Nf3-e5	b6-b5?	
Blac	ck should	have played	15
Nc6xe	5 16 d4x	e5 Qd6xd1	which
leaves	s White rat	her better,	but the
text s	hould have	lost.	
16	Ba5xf6	Be7xf6	

Or 16 ... g7xf6 17 Ne4xc6 Qd6xc6 18 Bc2xh7+! Kg8xh7 (18 ... Kg8-h8

19 Qdl-h5 or 18...Kg8-g7 19 Qd1-g4+ transposing to one of the other two lines) 19 Qd1-h5+ Kh7-g7 20 Qh5-g4+ Kg7-h8 Re1-e3 and Black has no defence against the threat of Re3-h3 mate.

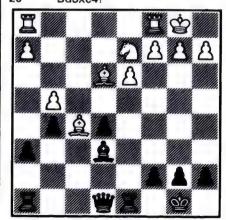
17 Nc3-e4! Bf6xe5
There is nothing better. 17 . . . Qd6-c7 allows 18 Ne4xf6+ g7xf6 19 Bc2 xh7+ and so on.

18 Ne4xd6 Be5xd6

19 Bc2-d3
19 Bc2-e4 followed by 26

19 Bc2-e4, followed by 20 d4-d5, is best, but there is nothing wrong with the text.

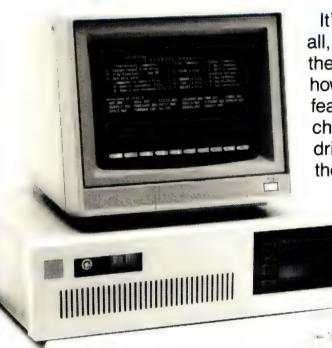
19 ... Nc6-e7 20 Bd3xc4?



Chessboard 2

This apparently harmless, indeer cal, move (when ahead, epieces) is the source of all Wh

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quent difficulties. White should not voluntarily create a strong, passed cpawn for the opponent, especially since it is apparent from the subsequent course of play that Belle has no idea what to do about it.

The correct course of play is 20 Ra1-c1 Ra8-c8 21 Qd1-e2 when Black is forced to exchange on d3.

20		b5xc4
21	Ra1-c1	Ra8-c8
22	Qd1-e2	c4-c3
23	Qe2-a6	Bd6-f4
24	Rc1-c2	Rc8-a8

24 ... Rc8-c7 would be more normal and better.

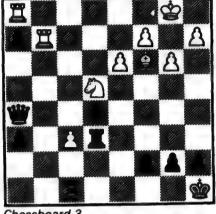
Qa6-b7? 25

This was the first of Belle's many opportunities still to play for a win with 25 Rc2xc3 Bf4-d2 26 Re1-c1 Bd2xc3 27 Rc1xc3.

Ne7-d5 Re1-e2

From here, until Black plays 35 ... a7-a6, practically every single move, by both sides, should be given a question mark. Both programs play the most appalling rubbish.

	Bf4-d2
Qb7-a6	g7-g6
Re2-e4	Rf8-c8
Kg1-h1	Rc8-f8
Re4-h4	Bd2-g5
Rh4-h3	Bg5-e7
Qa6-a4	Be7-f6
Rh3-d3	Rf8-d8
b4-b5	Rd8-b8
Rc2-c1	a7-a6
	Re2-e4 Kg1-h1 Re4-h4 Rh4-h3 Qa6-a4 Rh3-d3 b4-b5



Black is the first (and only) to break out of the pit.

36	b5xa6	Rb8-b6
37	a6-a7	Rb6-b7
38	Rc1-a1?	

If there were an escape route for the white king, then taking on c3 with either rook would be adequate for White. But there is still a way out with 38 Qa4-c6, followed by taking on c3, and White should not lose.

38		Ra8xa7	
39	Qa4-d1	Rb7-b2	ļ

Still with only bishop and knight for queen, Black is now clearly on

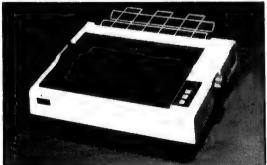
40	f2-f3	c3-c2!
41	Qd1-f1	Bf6-g5
42	g2-g3	Ra7-b7
The	end is nigh.	

1116	enu is mgm.	
43	f3-f4	Rb2-b1
44	Rd3-f3	Bg5-f6
45	f4-f5	Bf6xd4
46	Ra1xb1	c2xb1=Q
	0-1 (White	resigned)

END

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NUMBERS COUNT

Following up on the enthusiastic response given to Mike Mudge's musings on Perfect and Tri-perfect Numbers, this month he captivates you further with Sociable Numbers.

Definition (i). The Aliquot Divisors of a positive integer, n, are all of its divisors except for n itself. s(n) is used to denote the sum of these aliquot divisors of n. (ii) If s(n) = n, then n is said to be a Perfect Number (see 'Numbers Count', November 1983 & April 1984).

For example: if n = 28, then the aliquot divisors are 1, 2, 4, 7 and 14 from which it is readily seen that s(28) = 28.

(iii) If s(m) = n and s(n) = m, then m and n are said to form an *Amicable Pair*. In this case $s(s(n)) = s^{(2)}(n) = n$, where s is considered as an operator acting upon a positive integer.

For example: if n = 220, then the aliquot divisors are 1, 2, 4, 5, 10, 11, 20, 22, 44, 55 and 110, so that s(220) = 284. The aliquot divisors of 284 are 1, 2, 4, 71 and 142 whose sum is 220, thus $s^{(2)}(220) = 220$, and 220 and 284 are an amicable pair.

(iv) If s(m) = 2n, then n is said to be Triperfect.

The operator s can now be iterated; that is, applied repeatedly to a given positive integer, n.

(v) The numbers in the set n_1 , n_2 , n_3 , ... n_k are called Sociable Numbers with Index k, if and only if:

$$s(n_1) = n_2$$

 $s(n_2) = n_3$

 $s(n_{k-1}) = n_k$ $s(n_k) = n_1$

For example: 12496 1s is a Sociable Number with Index 4 because: s(12496) = 14288, s(14288) = 15472, s(15472) = 14536 and s(14536) = 12496.

It can be readily verified that 14316 is a Sociable Number with Index 28.

Until 1918, two sets of sociable numbers with indices 5 and 28 were known; reference P Poulet, 1918, Intermed Math (vol 25, page 121). H Cohen, reference 1970, Math Comp (vol 24, page 423) has conducted an extensive search for sociable numbers with index less than, or equal to, 10, of which the smallest member of the set is less than 60000000. This search has revealed nine new sets of sociable numbers with index '4' and has led Cohen to the interesting conjecture that there exists an infinity of sociable numbers with index 4.

Problems (A) Rediscover Cohen's nine sets;

(B) Iterate the function s(n) for any arbit-

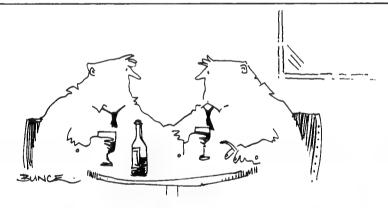
rary starting integer n₀, and hence find the index of sociability of n₀; and

(C) Generalise the concept of sociability in some way: for example, by redefining the function 's' as the sum of the even (or indeed the odd) aliquot divisors; or perhaps excluding aliquot divisors of the form pⁿ where p is prime.

Readers are invited to submit their attempts at some (or all) of the above problems to: Mike Mudge, C/- APC, 2nd Floor, 215 Clarence Street, Sydney 2000.

Submissions which must reach me by 25 July 1986, will be judged using suitably vague criteria. A prize will be awarded for the best entry received.

Please note that submissions can only be returned if a suitable stamped addressed envelope is provided.



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BENCHMARKS

A list of Benchmarks used when evaluating micros is given below. An explanation can be found in the February '84 issue.

100 REM Benchmark 1 110 PRINT "S" 120 FOR K=1 TO 1000 130 NEXT K 140 PRINT "E" 150 END 100 REM Benchmark 2 110 PRINT "S" 120 K=0 130 K=K+1

130 K=K+1 140 IF K<1000 THEN 130 150 PRINT "E"

160 END

110 PRINT "S" 120 K=0 130 K=K+1 140 A=K/K*K+K-K 150 IF K<1000 THEN 130

100 REM Benchmark 3

160 PRINT "E" 170 END 100 REM Benchmark 4 110 PRINT "S" 120 K=0 130 K=K+1

140 A=K/2*3+4-5 150 K<1000 THEN 130 160 PRINT "E"

170 END

100 REM Benchmark 5 110 PRINT "S"

120 K=0 130 K=K+1 140 A=K/2*3+4-5

150 GOSUB 190 160 IF K<1000 THEN 130

170 PRINT "E" 180 END 190 RETURN

100 REM Benchmark 6 110 PRINT "S"

120 K=0

130 DIM M(5) 140 K=K+1

150 A=K/2*3+4-5 160 GUSUB220 170 FORL=1 TO 5

180 NEXTL 190 IF K<1000 THEN 140

200 PRINT "E" 210 END 220 RETURN

100 REM Benchmark7 110 PRINT "S"

130 DIM M(5) 140 K=K+1

120 K=0

150 A=K/2*3+4-5 160 GOSUB 230 170 FOR L=1 TO 5

180 M(L)=A 190 NEXTL

200 IF K<1000 THEN 140 210 PRINT "E" 220 END 230 RETURN

100 REM Benchmark 8

110 PRINT "S" 120 K=0 130 K=K+1 140 A=K 2 150 B=LOG(K)

160 C=SIN(K)

170 IF K<1000 THEN 130

180 PRINT "E" 190 END

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Below is a complete list of User Groups known to us in Australian and New Zealand. User Groups' Secretaries are asked to provide us with alterations, additions and corrections as promptly as possible to avoid a longer than necessary delay before publication. During the next seven months these changes will be published and the next complete listing will appear in the December issue of APC.

NAME OF GROUP

MEETINGS:

CONTACT:

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
NEW SOUTH WALES			
Albury/Wodonga MicroBee User Group	МістоВее	Meetings are held on the 1st Monday of the month (except January), at the Albury High School, 7.30pm.	Eric Eulenstein 202 Kooba Street Albury NSW 2640
Ausborne User Group	All computers compatible with Osborne.	Every 3rd Wednesday of each month at the Burwood RSL, 96 Shaftsbury Road, Burwood, NSW, beginning at 6.30pm.	The Secretary PO Box C530 Clarence Street Sydney NSW 2000 (02) 438 7084 Bulletin Board: AUSBOARD (02) 439 7072
Bathurst Computer Group	General	Meetings are held on the 2nd and 4th Friday of each month during school terms at 7.30pm at West Bathurst Public School.	Liz Haddon Secretary Bathurst Computer Group 10 Uralla Circuit Kelso NSW 2795
Bay User Group	Commodore 64/128	Meets on the last Thursday of each month, between 5 and 7pm at Nelson Bay High School.	Wayne Herring Secretary PO Box 308 Nelson Bay NSW 2315
Blakehurst Computer College	BBC	Meets on the last Thursday of each month at the Blakehurst Computer College, 642 Prin- ces Highway, Blakehurst.	Lee Hourigan (02) 546 7399
Blue Mountains Homebrew Computer Club	General	Meets at members' homes.	Eric Lindsay 6 Hillcrest Avenue Faulconbridge NSW 2776 (047) 51 2258
Campbelltown User Group	General	_	Ernest P Leseberg 75 Lithgow Street Campbelltown NSW 2560
Cat User Group	Dick Smith Cat	-	Secretary Cat User Group 71 Milson Road Cremorne NSW 2090
Central Coast Apple User Group	Apple and compatibles	The group meets on the first Tuesday of each month at the Central Coast Grammar School, Erina Heights from 7.30pm.	Charles Lee (043) 67 6845 or Mick Tierney (043) 41 9350
Challenger User Group affiliated with Sydney PC User Group	Dick Smith Challenger	Meets at the 4th floor, Standards House, 80 Arthur Street, North Sydney on the second Tuesday of each month beginning at 5.45pm.	Geoffrey Towns (02) 929 4618
Dapto BBC User Group (DBUG)	ввс	The club meets at 7pm on the last Wednesday of each month at 3/74 Princes Highway, Dapto NSW.	DBUG PO Box 447 Dapto NSW 2530
Eastern Suburbs Commodore	Commodore	Meets every 2nd Monday at 8 pm, at the State Emergency Service Building, at the rear of 1355 Botany Street, Botany.	R Kellaway Secretary 10 Erang Avenue Kırrawee NSW 2232
80 Gamer User Group	TRS-80, System 80 and Color Computer users.	_	Jim Fisher 37 Fairburn Avenue West Pennant Hills NSW 2120
Gosford Commodore Computer Users (GOSCOM)	General	Meetings are held every 3rd Wednesday of the month at 7.30pm at the Library of East Gosford Public School, East Gosford.	The Secretary GOSCOM PO Box 86 Umina NSW 2257
Great Western User Group	General	The club meets on the 1st Tuesday of each month, 8pm at the Greystanes Community Hall, Merrylands Road, Greystanes NSW 2145	Secretary Great Western User Group PO Box 210 Wentworthvulle NSW 2145 (02) 631 2066 or (02) 636 9219
Hitachi/6809 User Group	Hitachi/6809	Meets at 2pm, 1st Saturday of each month	Rob Lohr President Hitachi/6809 User Group PO Box 966 Bondi Junction NSW 2022 (02) 662 4150
	C	Marian in Hammanan of Marianetti Dalam	Canadami

Meets at University of Newcastle, Room

W308 Education Building on the 2nd Wed-

nesday of each month at 8pm.

Secretary

PO Box 39

Hunter Úser Group

Broadmeadow NSW 2292

General

Hunter User Group

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
Illawarra IBM PC Club	IBM and compatibles	-	Secretary Illawarra IBM PC Club C/- John Lysaght (Aust) Ltd Delivery Code 29 PO Box 77 Port Kembla NSW 2505 (042) 75 6721
Macarthur Computer Users Association	General	Meets on the 1st Monday of each month at the Airds High School Library, Briar Road, Campbelltown, 7 30pm.	J Napier 23 Athel Tree Crescent Bradbury NSW 2560
Lismore C-64/128 User Group	Commodore 64	Meets on the 2nd Monday of each month at Kadina High School Library, commencing at 7pm.	Lismore Commodore 64/128 Computer Enthusiasts PO Box 385 Lismore NSW 2480 (066) 21 4054
OZBEEB	BBC	The group meets twice a month at the Australian Film and Television School — Open Program, 3 Lyon Park Road, North Ryde. A general meeting takes place on the 4th Monday of each month at 6.30pm.	OZBEEB PO Box 1030 Parramatta NSW 2150
Spellbinder User Group (SBUG)	Apple	The group meets on the 4th Monday of each month, 6pm at Room 9, Ground Floor Trades Hall, corner of Dixon and Goulburn Streets, Haymarket.	Kathie Hanson PO Box 171 Matraville NSW 2036 (02) 694 1523
Sydney MicroBee User Group	М ісго В ее	Meets on the 3rd Saturday of each month in the Assembly Hall at Strathfield Girls High School, Albert Road, Strathfield from 1 pm until 4pm.	Ron Taylor Secretary PO Box C233 Clarence Street Sydney NSW 2000 (043) 41 5251 (after 7pm)
TISHUG	Texas Instruments Professional, TI-994A and other 16 bit TMS9900- based personal computers.	-	John L Robinson Secretary PO Box 149 Pennant Hills NSW 2120 (02) 848 0956
Tuggerah Lakes Commodore User Group	Commodore 64	The group meets at the old Primary School Wyong (opposite Wyong Plaza), on the 1st and 3rd Thursdays at 6.30pm.	Frank James 125 Woolana Avenue Budgewoi NSW 2262 (043) 90 7339
Western Sydney PC and Compatibles User Group	PC and compatibles	Meetings are held on the 3rd Sunday of each month at 27 Cosgrove Crescent, Kingswood NSW 2750	Ben Sharif (047) 36 4825
VICTORIA			
Adam User Group	Coleco Vision Adam	Meetings are held as required at 10 Old Geelong Road, Point Lonsdale Vic 3225.	Dennis Riley President (052) 52 2237 or Frank Ellis Secretary (07) 345 7143
Apple User's Society of Melbourne (AUSOM) Inc.	Apple	Meetings are held on the 1st Saturday of each month at the Burwood Education Cen-	AUSOM Inc PO Box 49

VICTORIA			
Adam User Group	Coleco Vision Adam	Meetings are held as required at 10 Old Geelong Road, Point Lonsdale Vic 3225.	Dennis Riley President (052) 52 2237 or Frank Ellis Secretary (07) 345 7143
Apple User's Society of Melbourne (AUSOM) Inc.	Apple	Meetings are held on the 1st Saturday of each month at the Burwood Education Centre, Victoria College, Burwood Highway, Burwood.	AUSOM Inc PO Box 49 Burwood Vic 3125
BBC User Group	BBC	Meets on the last Wednesday of each month, 7-9.30pm at Copiquest, 423 Clarendon Street, South Melbourne.	Secretary Mr G E Howell (03) 420 2611 (BH) or President Mr T Robinson (03) 386 7529 (AH)
Color Computer Club	TRS-80 Color Computer	Meets on the 1st Friday of each month at Geelong College at 8pm.	David Collen Secretary 12 Hereford Drive Belmont Vic 3216 (052) 43 2128
Essendon Commodore 64 User Group	Commodore 64	-	George Strathoulis 8 Byron Avenue East Keilor Vic 3036 (03) 337 4159
Forth Interest Group	Forth	Meets on the 1st Friday of each month at 8pm. Contact Secretary for details.	Lance Collins PO Box 103 Camberwell Vic 3124 (03) 29 2600
Geelong Atarı User Group	Atarı	Meets on the 1st Tuesday of each month at the Newtown Club, Skene Street, Newtown, commencing at 7.45pm.	Brian Oates Secretary PO Box 673 Geelong Vic 3220
Geelong Commodore Computer Club	Commodore	-	Peter Hamilton Secretary C. 39 Vermont Avenue Coro Vic 3214 (052) 75 4949 or (052) 26 3596

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
KAOS	Ohio Scientific, Apple, Atari, IBM and others. Forth, CP/M, M/Code	The club meets at Essendon Primary School Raleigh Street, on the last Sunday of each month at 1 pm. And at the Hampton Scout Hall, corner of Kingston and Ludstone Street on the 1st Sunday of each month, at 2pm	KAOS Secretary 17 Frudal Crescent Knoxfield Vic 3180 (03) 763 5983
MBUG Australia Inc.	MicroBee	Monthly meetings are held at 7 30pm on the 2nd Wednesday of each month at Mount Waverley Community Centre, Corner of Stephensons Road and Miller Streets, Mount Waverley	Axel S Joscht Secretary MBUG Australia Inc PO Box 157 Nunawading Vic 3131 RCP M (03) 82 1571
Melbourne Atari Computer Enthusiasts (MACE)	Atarı	Meetings are held at the Rotunda, Monash University on the 2nd Sunday of each month (excluding January), at 12pm.	MACE PO Box 340 Rosanna Vic 3084
Melbourne Color Computer Club	TRS-80 Color Computer	The club meets on the 1 st and 3rd Tuesday of each month at the Uniting Church Hall, corner of Dandenong Road and Chapel Streets. St Kilda.	Mr Chris Hackett President 15 Redan Street East St Kilda Vic 3182 (03) 529 3735
Melb PC User Group Inc.	IBM and compatibles	Meets on the 2nd Wednesday of each month at 6pm at the Ground Floor Auditorium of Clunes Ross House at 191 Royal Parade, Parkville.	Secretary Melb PC User Group Inc. GPO Box 1728P Melbourne Vic 3001 (03) 481 1009
Lap Computer User Group	All lap computers	-	Secretary Lap Computer User Group Box 2884DD GPO Melbourne Vic 3001
NM Micro User Group	Interested staff members of National Mutual in the Melbourne Head Office using any computer.	Monthly	Mr R Prewett Convenor NM MUG Box 2830 AA GPO Melbourne Vic 3001
Otrona Attache User Group	Otrona Attache	-	David Broadbent Chairman C - PO Box 21 Ashburton Vic 3147 (03) 528 2792
Peninsula Group	General	Meets at the Frankston Library on the 2nd Tuesday of each month at 7.30pm.	M G Thompson (03) 772 2674
Pocket Portable Programmers of Melbourne Inc.	Hand held computers or calculators	Meets on the 3rd Tuesday of each month on the 9th Floor of the Monash University Men- zies building at 8pm.	Paul Cooper 40 Karen Street Box Hill North Vic 3129 (03) 898 7672 (AH)
Sorcerer & CP/M Users of Australia Inc. (SCUA)	Sorcerer, Excalibur, Bondwell and all machines which run the CP/M operating system.	Meetings are held on the 1st Sunday of each month (February to December), at 2pm. The location is Victoria College, Burwood Cam- pus, 221 Burwood Highway, Burwood, Vic 3125.	Secretary SCUA GPO Box 2402 Melbourne Vic 3001
Southern Districts Commodore User Group	Commodore	Meets on the 1st and 3rd Wednesday of every month at the A.P.I. Hall, Kurrajong Road, Preston, at 6pm.	A Toms President 3 Lucille Crescent Casula NSW 2170 (02) 602 8691
Teach-80 Group	General	Meets on the 1st Wednesday each month at the Waverley Centre, Miller Street Mt Waverley.	G Behrendorff Secretary (03) 232 4569
Turbo Pascal User Group	Turbo Pascal	1st Wednesday of each month, 7pm, at the Institute Function Room, RMIT Union, Melbourne.	Ron Savage PO Box 81 East Caulfield Vic 3145
Victorian Osborne User Group Incorporated	All Osborne types and any similar machines CP/M or MS-DOS.	Odd numbered machines — 4th Wednesday, 6pm at RMIT, Comms & Electronic Engineering Department, Building 12, floor 9. Even numbered months — 4th Sunday, 2pm at the Ashburton Public Library, 152 High Street, Ashburton.	Geoff Cartwright PO Box 169 Camberwell Vic 3124 (03) 459 8934 (AH)
Western Suburbs MicroBee User Group	МістоВее	1st and 3rd Thursday of each month at the Multiple Sclerosis Centre, corner of Furlong and St Albans Road, St Albans.	lan Walker (03) 741 3625 or Bradley Bouchaud (03) 336 1019
TASMANIA			
Southern Tasmanian Amstrad Club	Amstrad	The group meets at 7 30pm on the 1st Wednesday of each month at Elizabeth Matriculation College (1st Floor)	Vern McKay 137 Roslyn Avenue Blackmans Bay Tas 7152 (002) 29 4528
SVI-MSX Australasian User Group	Spectravideo MSX	_	SVI-MSX Australasian User Group PO Box 191 Launceston South Tasmania 724 (003) 44 2493
TI 99 4 User Group	TI 99 4 Users	Monthly meetings at the University of Tasmaria, Room 373, on every 3rd Sunday	Rex C Shephard 1 Benboyd Court Rokeby Tas 7019

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NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
andy Hobart User Group	Tandy	The group meets on the 3rd Thursday of each month at the Southern Regional Office of the Department of Sport and Recreation, Kirksway House, Kirksway Place, Hobart, Meetings commence at 8pm.	Tandy Hobart User Group GPO Box 127IN Hobart Tasmania 7001 (002) 72 1426 (AH)
A.C.T.			
ACT Apple	Apple	Meets on the 2nd Thursday of each month.	Secretary PO Box 1231 Canberra City ACT 2601
ACT VIC-20 User Association	VIC-20	-	Chris Groenhout 25 Kerferd Street Watson ACT 2602 (062) 41 2316
Australian Adventure Club	Apple and compatibles, Commodore 64	_	Charles Newton JR 19 Cloncurry Street Kaleen ACT 2617 (Commodore 64 users only) Bernard A Wiemers 10 Tardent Street DO Tardent ACT 2602 (All other computer users).
Australian ZX User Association (ASUA)	Sinclair Computers	Meets on the last Wednesday of each month at the Woden Valley High School Library, Ainsworth Street, Phillip.	David Vernon AZUA 50 Waller Crescent Campbell ACT 2601
Canberra Micro-80 User Group	TRS-80, System 80 and any other Z80- based microcomputers.	Meets on the 3rd Monday of each month in the large lecture theatre of Building J. Can- berra Technical College, Constitution Avenue, Reid at 7.30pm.	Harry Cooper Secretary 113 Owen Dixon Drive Evatt ACT 2617 (062) 58 3700
Compucolor User Group	Compucolor	_	Ken Kerrison 5 Beltana Road Pialligo ACT 2609 (063) 47 6575
QUEENSLAND			
Adventure Club	Commodore 64/128	Postal only. Bi-monthly newsletter.	Adventure News Stuart Elflett M.S.F. 550 Toogoolawah Qld 4313 or Adventure News Jamie Osborne 123 Beatrice Street Doubleview WA 6018
Australian Postal Institute Computer User Group	-	Meetings are held on the 1st Monday of each month, 6.15pm at 14th floor, AAMI building, 97 Creek Street, Brisbane.	Steve Devine (07) 835 7044 or Keith Atkinson (07) 835 8033
Brisbane Spectravideo & MSX User Group	All MSX and Spectravideo	-	Lucille Parker Secretary 25 Primrose Street Woodridge Qld 4114
Brisbane 16-bit User Group (BRISBUG)	16-bit micros	Meets on the 3rd Sunday of each month, 2pm at the Toowong High School.	Roy Willie Jnr BRISBUG PO Box 305 Wynnum Central Qid 4178
Bundaberg Commodore Computer User Group	Commodore	The group meets on the 1 st Sunday of each month from 10am to 4pm at the West State School Library, Steffensen Street, Bundaberg.	(071) 72 7098 or (071) 79 2426
Cairns Commodore User Group	Commodore	-	PG Aiken Secretary Cairns Commodore User Group PO Box 7 Earlville Cairns QLD 4870
Commodore Computer User Group (Qld) Inc.	Commodore	Meetings are held on the 1st Tuesday of each month (except January), at 7.30pm in the Playground and Recreation Association Hall at the corner of Love Street and Water Street in Spring Hill, Brisbane.	Norm Chambers PO Box 274 Springwood Qld 4127 (07) 341 5651
Commodore Computer Users Group (Townsville)	Commodore	Meetings are held at 7.30pm on the 1st Wednesday of every month (except January), at the computer room of Ignatius Park College, Ross River Road.	Bruce McGovern Secretary 43 Fitzroy Street Cranbrook Townsville Old 4814 (077) 75 4349
Compucolor User Group	Compucolor	Meets on the 2nd Saturday of each month at 1pm	Ray Halliday 325 Enoggera Road Newmarket Old 4051 (07) 356 4236

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
Darling Downs Apple Users Group	Apple	Meets on the 3rd Tuesday of each month at the Toowoomba Education Centre, Baker Street, Toowoomba.	Darling Downs Apple User Group PO Box 53 Darling Heights Qld 4350 or contact the group Secretan (Alan Chapman (076) 38 4853 (AH)
Memotech Computer User Group	Memotech	_	(076) 32 3933 Extension 1 (BH) Memotech Computer
·			User Group PO Box 497 Maroochydore Qld 4558
NEC PC-8000 User Group	NEC-PC-8000	Meets on the 2nd Friday of each month at the Old Town Hall, South Brisbane.	NEC PC-8000 User Group C/- David M Clark 18 Provence Street MacGregor Qid 4109
Queensland Amstrad Users Cassette Journal	Amstrad	Circulation of a monthly cassette or disk.	Frank Ellett 59 Twentyseventh Avenue Palm Beach Qld 4221 (075) 35 5815
Queensland CP/M Users	Any CP/M computer	Meetings are held on the last Sunday of each month at the University of Queensland Civil Engineering Work Room 1.01 (off Staff House Road) from 1 pm.	Secretary/Treasurer PO Box 1025 Milton Qld 4064 (07) 369 4288
Sega User Group	John Sands Sega	-	Keith Zuch (07) 288 3115 or Robert Horkings (07) 52 5603
Sharp User Group of Brisbane	Sharp	The club meets on the 2nd Wednesday of each month at the Graceville State School.	Bill Laidlaw 51 Sandon Street Graceville Qld 4075 (07) 379 3457
Southport Commodore Computer User Group	Commodore	Meets fortnightly at the Labrador State Primary School, Turpin Road, Labrador.	Mark Voevodin Secretary (075) 50 2299 or John Smith Co-Secretary (075) 58 2929
Townsville MicroBee User Group	MicroBee	Meets at 7.30pm on the 2nd and 4th Mon- day of each month at St Margaret Mary's School, Hermit Park, Townsville.	Mannie Van Rijswijk (077) 73 4236
TRS-80/System 80 Computer Group	TRS-80 (Models I, III, 4, 4P), and System 80	Meets on the 1st Sunday of each month (except January), at 2pm, at Lindum Hall, Lin- dum Road, Lindum (near Wynnum, Brisbane)	W J Allen Secretary 16 Laver Street Macgregor Old 4109 (07) 343 5771
University of Queensland Kaypro User Group	Kaypro	Meets bi-monthly at the Botany Department.	David Yates 377 2070 (Botany Department)
University of Queensland Osborne User Group	Osborne	Meets on the 2nd Tuesday (odd months), and 2nd Wednesday (even months), at the Axon Building (on campus), at 7pm.	Glen McBride C/- Womens College College Road St Lucia Old 4067 (07) 870 1177
VZ South Pacific User Group	VZ-200/300	-	John D'Alton 39 Agnes Street Toowong Qld 4066 (07) 371 3707
SOUTH AUSTRALIA			
Adelaide Atarı Computer Club	Atarı	The group meets at the Gillies Street Primary School, City, on the 1 st Monday (2nd, if 1 st is on a public holiday), and 3rd Monday of each month at 7.30pm.	Adelaide Atari Computer Club PO Box 333 Norwood SA 5067
Adelaide Sega User Group	John Sands Sega	-	Jan Jacobsen (08) 382 7967 or Jamie Anderson (08) 263 5020
Australasian Aquarius Users Club	Aquarius Computers	Bi-monthly newsletter	Australasian Aquarius Users Club 7 Duncraig Lane Stirling SA 5152
Beebnet	BBC and Econet	Meetings are held on the last Monday of each month.	Beebnet PO Box 262 Kingswood SA 5062
Darwin PC User Group	IBM and compatibles	The group meets on the 1 st Sunday of each month at 5 Binet Court, Malak, at 8pm.	Terry O'Brien 5 Binet Court Malak SA 5793 (089) 27 4454
Hitachi User Group	Hitachi	-	Cliff Hignett 45a Ormond Avenue Daw Park SA 5041 (08) 276 7706



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NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
MicroBee User Group of South Australia Inc.	МістоВее	Meets on the 3rd Monday of each month (except January), at 18 Arthur Street, Unley, 7.30pm.	Secretary GPO Box 767 Adelaide SA 5001
South Australian Apple User Club Inc.	Apple II series and has a Mac user group.	The club meets on the 1st Friday of each month at the Prospect Town Hall.	SA Apple User Club PO Box 322 Prospect SA 5082 Secretary (08) 293 7183
South Australian Commodore User Group	Commodore	Meets on the 1st Tuesday of each month at Gilles Street Primary School, Gilles Street, Adelaide, at 7.30pm.	SA Commodore Users Group PO Box 427 North Adelaide SA 5006
WESTERN AUSTRALI	A		
Australian QL User Association (AQUA)	Sinclair QL	Meets every other month.	Graeme Ashford Secretary 12 St Michael Terrace Mount Pleasant WA 6153
Australian Turbo User Group	All Pascal and Modula-2	The group meets monthly (Feb to Nov), every 2nd Tuesday at Room G-3, Electrical and Electronic Engineering Building, University of WA, (use Fairway entrance 3 or 4). The meeting commences at 7.30pm.	Australian Turbo User Group WA School of Computing and Computing Science 2/294 Rokeby Road Subiaco WA 6008 (09) 382 2692
Compucolor User Group	Compucolor	As announced in newsletter.	Doug Grant 2 Brookside Averue South Peth W (09) 367 4445
Excalibur 64 User Group	Excalibur	-	Jim Barbas (09) 342 3625 (AN) (09) 325 5809 (BH)
MicroBee User Group of Western Australia (MUGWA)	MicroBee	The meetings are held at 7 pm on the 1 st Sun- day of each month at the Nurse's Lecture Theatre of the Sir Charles Gairdner Hospital, Shenton Park.	The Membership Officer GPO Box NIO90 Perth WA 6001
Osborne User Group (OSWEST)	Osborne and other machines running CP/M	Meetings are held on the 1st and 3rd Wednesay of each month at the Palmyra Recreation Centre (1st Wednesday), Subiaco Exhibition Hall (3rd Wednesday), Meetings are held at 7.30pm.	Robert Hunt Secretary DSWEST 4 Cato Street Glendalough WA 6016 (09) 444 0071
Sega User Group	John Sands Sega	-	John McLennan (09) 342 5905
WA Cromemco User Group	Cromemco and other S-100 and similar computers.	Meets monthly (Feb to Nov), every 3rd Tuesday at Suite 2, 294 Rokeby Road, Subiaco. Meetings commence at 7.30pm.	Secretary WA Cromemco User Group Suite 2/294 Rokeby Road Subject WA 6008

NEW ZEALAND

EPSON Personal Users Group, CW Nighy. Telephone: 77 4268, Minerya NFC001. Meetings: 1st Tuesday of each month at 231 Khyber Pass Road, Auckland.

NZ Commodore User Group (AK): Kaye Coddigton. Telephone 58 8931, PO Box 5223, Auckland. Meetings: 3rd Wednesday of each month at the Remuera Primary School Hall, Dromorne Road, Remuera.

NZ Microcomputer Club Inc: Peter Taylor (Chairman). Telephone 57 6618, PO Box 6210, Auckland.

Tomorrow User Group: Chris Cotton. Telephone: 78 9153 or 39 6185. Meetings: 3rd Wednesday, ASMAIL, 205 Federal Street, Auckland City. ASMAIL system is also available to Australians. It can be contacted by Packet-Switch Networks such as AUSTPAC. Number is 0 5301 9700 0016. Enter at the prompt "asmail login:". The word 'asbox" to send a message to ASMAIL requesting membership information. The answer back code is ASO002 MAIL. Address is: PO Box 39-159, or telephone 39 6185 Auckland. Users may join by telephone if they have a

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A comprehensive list of available for Tandy Color Computer users wanting to locate their nearest User Group. This list may be obtained by writing to Andrew White, 24 Barfoot Street, Bracken Ridge, Old 4017. The list is much too long to be published

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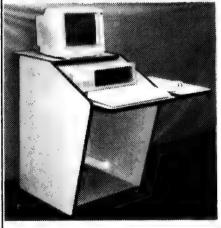
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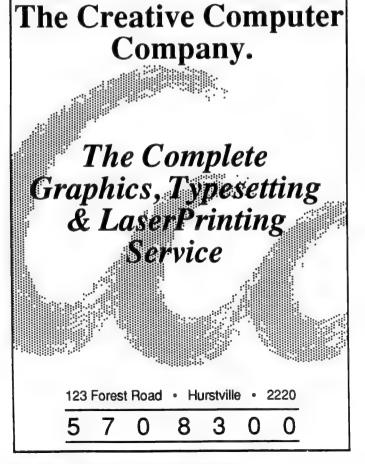
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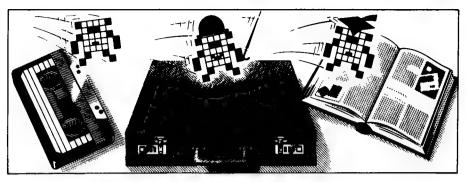
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Educational/Computer
Aided Learning

Owen Linderholm selects the best of readers' programs. For details on submitting your own, see the end of this section.

In Program File last month I mentioned the changes which are taking place in the column. So far, little indication of how readers feel about these changes has reached me, although some people have begun to send in programs containing improved documentation. Please let me know your opinions of the new-style Program File, especially those of you who contribute programs.

I must stress once again that I receive too many programs such as disassemblers, Hangman, versions of Othello, character set editors, and so on. The principles of these oft-published programs apply to almost all current machines, so do not need to be repeated. I would like to receive novel applications of the sort that APC, and everyone else, has not seen before, an example of which is the expert system published in the March issue. Although similar programs have appeared as commercial products, that was the first time, to my knowledge, that an expert system of some real utility has appeared as a listing.

Remember that an increasing number of machines is being catered for by Microtex 666, so that program listings which appear for these micros in APC are available for downloading from Microtex 666. And of course there is a range of other programs also available from the Microtex telesoftware library — so if you're hungry for listings, join Microtex 666.

The recent announcements for the Atari ST and the Commodore Amiga have pushed the old-favourite home machines back into the shadows. As always, the new fashions get all the coverage, but unlike the fashion world, computers go on being used; it is still possible for the old, work-weary-Spectrum to produce something exciting.

Yes, you've guessed it — the Program

of the Month is for the plain, vanillaflavoured 48k Spectrum. It is called Animator, and produces smooth, highresolution animation from up to 15 frames; animation is at a speed of up to 25 frames per second. Screens are created from within the program and can be played back at variable speeds. The demonstrations which accompanied the program were: a cut-away model of a four-stroke engine at work; the valve gear of a steam locomotive; and a spinning globe.

Computer animation is a subject which interests many people. The classic technique, lifted straight from the way in which films and cartoons work, is to display frames (or pictures) in rapid succession. If each frame is slightly different from the last, then this creates the illusion of motion. The problem with computers is the speed with which a full screen of high-resolution graphics can be displayed, and the huge amounts of memory required to hold the pictures. The solution is to compromise on resolution, colour, size or speed.

Animator uses the classic film-making technique, and achieves the remarkable speed of 25 frames per second by only animating one third of the Spectrum screen and only using two colours. This allows up to 15 frames of high-resolution graphics to be used, so it is possible to create some good animation.

The uses to which personal computers are put have changed from the early days of microcomputing. Originally, they were used by enthusiasts for programming and investigating internal secrets. (Incidentally, these enthusiasts were the hackers of that time. It is only relatively recently that 'hacker' has become a name for someone who uses telecommunications systems to break into other people's computer systems. Formerly a

hacker was 'merely' a computer enthusiast.)

The most common function of computers is as word processing systems, and just as the IBM juggernaut is generating copies and clones, so WordStar, the word processing heavyweight, is generating copies. Many computer users use WordStar in one form or another, and M Rhodes has discovered an undocumented feature of WordStar. This tip allows global searches and replaces to proceed very quickly by switching off their appearance onscreen.

Program File often acquires an international flavour, as contributions come from around the world. Miguel Campos of Peru has submitted a subroutine of great value for Apple programmers. It simulates an Erase Array command, allowing the redimensioning of arrays from within a program.

Dr Vaclav Skala of Czechoslovakia has sent in a tip regarding the way in which variables are stored internally in the Amstrad CPC machines, and shows how to use this information to provide a cross-referencing utility.

Other programs this month include Commodore 64 Stock, a simple stock control and re-order database for small businesses or shops.

For Amstrad users, there's a utility which displays the Caps Lock and Shift Lock status at the bottom of the screen; separately is a utility for cross-referencing variables in program debugging; and there's another listing from Justin Moffitt, the author of the popular Amsquill program which featured in the December 1985 issue of APC. Lastly, there is a short 'pausing' utility for the VZ-200.



Amstrad LOKVIEW by Paul Jenkins

This short machine code routine displays the Caps Lock and Shift Lock state at the bottom of the screen. It is interrupt-driven and so works continually once it has been set up.

To set up the machine code program, use the Basic loader which checks for typing errors in the machine code data. Once the data has been entered correctly and POKED into memory, save it with SAVE "lokview.bin", b, &xxxx, &FO

where &xxxx is the start address of the machine code. It is important to save the machine code before it is called. As the program is relocatable, it can be installed anywhere in memory and run from there. The Binary Loader program loads the program just above HIMEM, and can be merged into any program where the status is to be displayed.

The assembly listing shows how the program works. Firstly, screen

windows are set up; then an interrupt routine is added to the Frame Flyback event. The routine then returns to Basic, but the interrupt routine will be activated every fiftieth of a second. After a Mode command, the windows will be changed; they can be reset by WINDOW 1,80,1,24:WINDOW #7,1,80,25,25, or you can CALL the address at which LOKVIEW is stored.

```
•
                  * LOKVIEW # LOKVIEW # Paul 8 Jenkins # 1966 #
                                                                                                                                                                                                                                           CALL NZ, shift_on JP txt_stream_select
                                                                                                                                                                                                                                                                                                                .
                                                                                                                                           LOKVIEW Assembler Listing
                                                                                                                                           .caps_on
LD HL.caps_string
JR print
•
                    ' Basic Loader
                                                                                                                                                                                                                                                                                                                .
                                                                                                                                                                                                                                          .shift_on
LD HL,shift_string
                                                                                                                                          .start
LD A, &O7
CALL txt_stream_select
LD DE, &O018
LD HL, &4F18
CALL txt_clear_window
XOR A
CALL txt_stream_select
LD DE, &O000
LD HL, &4F17
CALL txt_win_enable
CALL txt_min_enable
CALL txt_min_enable
CALL txt_clear_window
           90 address=HIMEM-kF0
110 entry=address
120 WEMORY address=1
130 WESTORE 2F0
140 FOR 11n=2F0 TO 580 STEP 10
                                                                                                                                                                                                                                          .print
LB A,(HL)
CP &OO
RET Z
CALL txt_output
•
                                                                                                                                                                                                                                                                                                                •
.
                                                                                                                                                                                                                                                                                                                •
            140
                           mus=0
FOR column=0 TO 7
READ byte#
value=VAL("k"+byte#)
POKE address, value
sum=value
address=address+1
                                                                                                                                                                                                                                           INC HL
JR print
            170
                                                                                                                                                                                                                                                                                                                .
                                                                                                                                                                                                                                           .block
DEFS 1409
            190
200
210
•
                                                                                                                                                                                                                                                                                                                •
                                                                                                                                                                                                                                           .flags
DEFS:k02
                           NEXT column
READ checksum
If checksum
                                                                                                                                             ret_only
                                                                                                                                        NOP
LD DE, &1840
LD HL, entry
LD (HL), D
INC HL
LD (HL), E
          •
                                                                                                                                                                                                                                          .caps_string
DEFS &18
DEFS 'CAPS'
DEFS &18
DEFS &00
                             error at line"; lin:STOP
•
                                                                                                                                                                                                                                                                                                               •
                                                                                                                                         INC HL
LD (HL),E
LD HL,ret_only
LD A,&CP
LD (HL),A
LD HL,block
LD B,&el
LD C,&CO
LD DE,i_routine
JP ki_new_frame_fly
                                                                                                                                                                                                                                           .shift string
DEFB &IS
DEFB 'SHIFT'
DEFB &18
DEFB &00
                                                                                                                                                                                                                                                                                                                •
•
                                                                                                                                                                                                                                                                                                                •
                                                                                                                                                                                                                                           END
.
                                                                                                                                          .i_routine
PUSH AF
PUSH SC
PUSH DE
PUSH HL
•
                                                                                                                                                                                                                                                                                                                PUSH MI.
LD DE, flags
CALL km_get_state
EX DE, ME
LD A, D
CP (ML)
JR NE, change
LD A, E
ING ME
CP (ML)
JR Z, set_flags
•
                                                                                                                                                                                                                                                                                                                .
                                                                                                                                                                                                                                                                                                                •
                                                                                                                                                                                                                                                                                                                •
.
                                                                                                                                                                                                                                                                                                                •
                                                                                                                                         .set_flags
LD DE,flags
CALL km_get_state
EX DE,HL
LD (HL),D
INC HL
LD (HL),E
POP HL
POP DE
POP BC
POP SC
POP AF
.
                                                                                                                                                                                                                                                                                                                •
           •
             40
70
80
90
•
                                                                                                                                                                                                                                                                                                               •
                    Binary Loader
                                                                                                                                          POP
            90 '
100 SYMBOL AFTER 256
110 address=HIMEM-&F0
120 MEMORY address=1
130 SYMBOL AFTER 240
140 LOAD**!okview.bin*,address
150 CALL address
160 PRINT**LOKVIEW* is now loaded*
170 PRINT*at address &*;HEX*(address,4)
180 PRINT*Press CAPS LOCK a few times*
190 PRINT*to see the routine working...*
200 PRINT:END
210 ' lokview
                                                                                                                                                                                                                                                                                                               •
•
                                                                                                                                            . show
                                                                                                                                          .snow
LD A,&O7
CALL txt_stream_select
CALL txt_clear_window
                                                                                                                                                                                                                                                                                                               •
                                                                                                                                           CALL km_get_state
EX DE,HL
CP D
•
                                                                                                                                                                                                                                                                                                               •
                                                                                                                                                 L NZ,caps_on
                                                                                                                                                                                                                                                                                                               •
```



Program of the Month Spectrum Animator by I Bickerstaff

Spectrum Animator creates animated sequences on the 48k Spectrum. It uses one third of the screen and only two colours, so 15 frames can be stored in memory. When the program is run, the background and foreground colours are set up and a menu is displayed. This gives you options to load and save animation sequences; draw individual frames

using a simple drawing program; run the animation at normal speed; run it in slow motion with variable speed; program an animation sequence; display an animation sequence; and change colours.

It is possible to program the animation sequence to display any sequence of up to 50 frames, in any order, made up from the 15 which the computer can store.

The program is very short and compact in order to leave room for the animation frames, so it isn't documented. It is, however, clearly written, and it should be fairly easy to decipher how it works. Some sample frames from the spinning globe animation are given with the program.

```
$32 IF INKEYS-"O" THEM PRINT AT Y.E; OVER 6;" ": IF Y:8 THEM LET Y=Y-1

$33 IF INKEYS-"L" THEM PRINT AT Y.E; OVER 6;" ": IF Y:15 THEM LET Y=Y-1

$40 IF INKEYS-"E THEM REEP 6.65.30: 00 RMS 6000

$40 IF INKEYS-"E THEM REEP 6.05.30: 00 TO 199

$40 IF INKEYS-"E THEM REEP 6.05.30: 00 TO 199

$40 POLK 03.01(1): POKE 02.0(1): IMPLT "Lable:- "128: IF LEM 18:32 THEM PAPER b

order: CLS : 00 SUS 9000: 00 SUS 200: RANDOMIZE USR 01: 00 TO 700

$70: RANDOMIZE USR ODD: LET Z=15: LET Y=12: PRINT /0; FLAM 1:"E x 0 1 ROVER 10

100"
                                                                                                            2 FOR n=0 TO 7 STEP 2: POKE USR "a"+n,136: POKE USR "a"+n+1,34: HERT n
3 DIN g(N0): LET cl=35012: LET c2=35000: LET c3=35014
                                                                                                3 DIN g(80): LET 01-33-38 IL LET 03-33-38 set termine 4 LET 48-7 POR necode TO code-23: READ X: PORE n.z. MECT n E LET members 1,7-46.60-1.0-0.237:176.381 6 DATA 33:48:00:17.07.72:1.0-0.237:176.383 9 DATA 43:51 POR nel TO 13: LET a(n)-00((n-1)*0): MECT n 10: LET m-133: POR nel TO 13: LET a(n)-00((n-1)*0): MECT n n weeten 0 Porse 0 Code 
  •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ble" PME RAMBONIES UME (01: BELOWT %: OVER 6: PRINT AT y.m; PAPER peper;ző: PRINT AT 10:0; LME 7; PAPER beceder;qő: PALME 0 7003 FZ INCETE-"m" AND 2:0 THEM LET m.m.; 1 TMEN LET
  •
                                                                                          100 INSULT "Paper Colour 7 (8-7) "|paper: IF paper: OR paper: TORN CO TO 188
101 INSULT "Ink Colour 7 (8-7) "|ink: IF ink: 7 (8) ink: 6 THMS CO TO 181
101 INSULT "Ink Colour 7 (8-7) "|ink: IF ink: 7 (8) ink: 6 THMS CO TO 181
102 INSULT "Berder Colour 7 (8-7) "|increase: IF borders Colour 7 (8-7)
                                                                      102 INDUT "Barder Colour 7 (0-7) "| norder 1 F border 7 OR border 6 THOM OO TO 102 INDUT "Barder Colour 7 (0-7) "| norder 1 F border 7 OR border 6 THOM OO TO 102 INDUT 1 INDU
  706 IF IMERITO-"1" AND y(15 THEM LET ymp)1
716 IF IMERITO-"1" THEM SEEP 0.06.30: IMPUT "1; GO TO 190
716 IF IMERITO-"4" THEM SEEP 0.06.30: IMPUT "1; GO TO 190
726 OF TO 702
1000 OF MIN SEEM
1000 DE MIN SEEM
1100 DE MIN SEEM
110
  •
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1146 GD TO 1160
2008 GD SUB 9000
2008 PRINT AT 18-8; PAPER border; IME 9;"any key -retura to comu";AT 21,16;"25 £
                                                                               TO 2000
211 IF INCEYS-"s" AND 2>-1+step THEM SEEP 0.005.1: PLOT 2:y: LET 2=2-step: GO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Vescond"
PUR Set TO IE
PURIS GS.N(n): RANDCRIZE UNN GI'S PAUME I
REST N
                                                                112 F INKEYS="1" AND y-57-stop THEN SEEP 0.005.1: PLOT x.y: LET y-y-stop: GO TO 250

213 IF INKEYS="0" AND y-112-stop THEN SEEP 0.005.1: PLOT x.y: LET y-y-stop: GO TO 250

214 IF INKEYS="0" AND y-112-stop THEN SEEP 0.005.1: INVERSE 1: PLOT x.y: LET y-y-stop: HVF-SEE 0: GO TO 250

215 IF INVERSE 0: GO TO 250

215 IF INVERSE 1: ROD y-57-stop THEN SEEP 0.005.10: INVERSE 1: PLOT x.y: LET y-y-stop: INVERSE 1: PLOT x.y: LET y-y-stop: INVERSE 1: PLOT x.y: LET y-y-stop: IV-SEE y-stop: IV-SEE y-stop: IV-SEE X-stop: IV-S
                                                                                 TO 2000
212 IF INKEYS="l" AND y>47+step THEN | DEEP 0.006,1: PLOT 2:y: LET y=y=step: 00
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                                                                      223 LET sterretm
223 IF : INCETS-"e" AND step-6 THEM BEEF 6.002.40: LET step-step-1: PRINT AT 17.
11: PAPER border: BRIGHT 0; INC 9;step: PAUME 0: IF INCET6.7" THEM GO TO 225
224 IF : INCETS-"P" THEM BEEF 0.005.30: GO BUD 0000
225 IF : INCETS-CHOS 3 THEM BEEF 0.05.20: POEK 03.6(f): RAMDOMIZE UGR CODe: MEX
                                                                         225 IF INCLYS-CRS 13 THEN BEEP 0.05.20: FORE 0.3.4(f): RAMDONIZE USR CODE: MEX T F: GO TO 5888 BEEP 0.05.20: FORE 0.3.4(f): RAMDONIZE USR CODE: MEX 227 IF INCLYS-"0" THEN DO SUS 480 CAS 15 INCLYS-"0" THEN CO TO 239 CAS 15 INCLYS-"0" THEN CO TO 239 CAS 15 INCLYS-"0" THEN SEEP 0.05.30: GO TO 780 CAS 15 INCLYS-"0" THEN SEEP 0.05.30: GO TO 780 CAS 15 INCLYS-"0" THEN SEEP 0.05.30: GO TO 780 CAS 15 INCLYS-"0" THEN CO TO 230 CAS 15 INCLYS-"0" THEN CO TO 230 CAS 15 INCLYS-"0" THEN CO TO 25 INCLYS-"0" THEN CO 25 INCLYS-"0" 
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  •
                                                                                                                                IMPUT "Position vertically ? "[pv: IF pv:0 OR pv:255 THEM GO TO 401
IMPUT "Radium ? "[r: IF pv:r:175 OR pv-r:0 OR ph:r:255 OR ph-r:0 THEM GO T
  •
                                                                   482 IMPUT "Radius ? ";r: IF pv+r:)75 OR pv-r:0 OR ph+r:255 OR ph-r:0 THOM OD TO
489 FOR n=0 TO 7: PAPER paper: PRINT AT n.0;q$: IMEXT n: POR n=16 TO 21: PRINT A
7 n.0;q$: MEXT n: OVER 1: CIRCLE ph;pv;r
410 IMPUT "O.K. ? (y/n) ";x$: IF x8="y" THOM BRIGHT 0: OVER 0: POKE c2:e(f): P
DEL c2:e(f): MEMONIES UNK code: FAPER border: CLH:: ND BUS YEMM: NAMDOHIES UNK
01: OD BUS 120: RETURN
415 CIRCLE ph;pv;r
420 OD TO 400
500 LET x=15: LET y=12: BRIGHT 1: PAPER paper
500 LET x=15: LET y=12: BRIGHT 1: PAPER paper
500 PRINT AT y,x; OVER 1; PLANH 1;"E": PAURE 0; BEEP 0.005.1: PRINT AT y,x; OVE
8 1:"E"
     •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    •
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                                                                               505 PRINT AT y.z. OVER 1; FLAME 1;"E": PAURE 0: SEEP 0.005.1: PRINT AT y.z.

$10 IF INKEY90-"z" THEM PRINT AT y.z. OVER 0:"E": IF z.0 THEM LET z=z.1

$11 IF INKEY90-"z" THEM PRINT AT y.z. OVER 0:"E": IF z.0. THEM LET z=z.1

$12 IF INKEY90-"z" THEM PRINT AT y.z. OVER 0:"E": IF y.0. THEM LET z=z.1

$13 IF INKEY90-"z" THEM PRINT AT y.z. OVER 0:"E": IF y.0. THEM LET y=y-1

$20 IF INKEY90-"z" THEM IF z.0 THEM LET z=z.1

$21 IF INKEY90-"z" THEM IF z.0 THEM LET z=z.1

$22 IF INKEY90-"z" THEM IF y.0 THEM LET y=y.2

$23 IF INKEY90-"z" THEM IF y.0 THEM LET y=y.2

$25 IF INKEY90-"z" THEM IF y.0 THEM LET y=y.2

$26 IF INKEY90-"z" THEM PRINT AT y.z. OVER 0;" IF z.00 THEM LET z=z.1

$25 IF INKEY90-"z" THEM PRINT AT y.z. OVER 0;" ": IF z.00 THEM LET z=z.1
     .
     •
```



WordStar Fast Search/Replace by M Rhodes

It is usually preferable to compose reports in single-spacing (to see as much as possible on the screen), and to convert the final draft to doublespacing immediately before printing. Normally, people change the line spacing using the APS option, and then reformat the text using AB. In the case of long files this is timeconsuming, and has the disadvantage of obliterating the beginnings and ends of paragraphs where these are indicated by a blank line.

The following method uses some little-known WordStar commands. It

not only reformats long files in a matter of seconds, but also retains the paragraph breaks. The steps are as follows:

1) Copy the text file into a temporary file, called TEMPOUT.DOC. The original file should not be used as the procedure prevents any further reformatting.

2) Edit TEMPOUT.DOC using the D option.

3) Use ∧Q A to execute a find-andreplace. At the FIND? prompt enter ^P^N: at the REPLACE WITH? prompt enter $\triangle P \triangle N \triangle P \triangle N$; and at the OPTIONS? prompt enter NG.

4) Check that the procedure is working correctly, then press Escape. This undocumented command switches off the screen echo during a findand-replace. The effect is to greatly speed up the procedure, so that what might otherwise take many minutes takes only a few seconds. This would greatly speed up any global search/

Save the TEMPOUT.DOC using ∧K

D, then enter P to print it.

6) Delete the temporary file.



Erase Arrays for the Apple 11 by M Campos

Microsoft Basic on CP/M systems provides a command Erase a1,a2, . . which clears the arrays a1,a2,... from memory, allowing them to be redeclared in a new DIM statement. The routine given here takes advantage of the pointers kept by Applesoft in zero page, and takes approximately two seconds to clear five arravs.

Applesoft keeps a pointer to the place where the array space starts (ARYTAB, kept in locations 107 and 108 of zero page) and another to the byte following the last array element (STREND in locations 109 and 110). Within the array space, starting in ARYTAB, each array is stored with a header containing the following information.

Bytes 1 & 2: characters 1 and 2 of the array name. If integer or string, add 128 to the value of the first charcter; if string, add 128 to the value of the second character.

Bytes 3 & 4: pointer to the position of the next array header, stored as the number of bytes that have to be added to the array address in order to get the next array.

In the following bytes, Applesoft stores the dimensions of the array, and the array contents or pointers, to the string space. The routine works by finding the requested array and locating the pointers to the start (AFIRST) and end (ALAST) of the space occupied by the array. It then shifts all the memory contents between ALAST+1 and STREND to MICROTEX 666

This program is available electronically through Microtex 666's software downloading service. It is accessed through Viatel page *66637#.

start in the position AFIRST.

The routine is more efficient if asked to erase the last dimensioned array. The only entry parameter is the name of the array to be erased, stored in the string variable Z\$.

Each time a new variable is created these pointers are updated, so after the location of the pointers has been obtained, no new variables should be created. The routine occupies about 300 bytes of memory, and so is only worth using when dealing with arrays of more than 500 bytes (100 real elements or 250 integer).

```
.
       600
             REM E R A S E
                                                                     Line 604 continued...
       601
                                           !Sets space for S
             S = 0
                                          !Commodity constant
!Length of var name
             M = 256
                                                                          S = S - L
                                                                                                                 !Reset zero page
             L = LEN (Z$)
                                                                          Y = INT (S/M)
             I = ASC(MID*(Z*,L,1))
                                           !Suffix code
                                                                          X = S - Y * M
                                                                                                                 •
             X = ASC(MID*(Z*,1,1))
                                           !First character
                                                                          PDKE 109. X
             Y = 0
                                           !Second character
                                                                          POKE 110, Y
             IF L > 1 THEN
                                           !Set second character
                                                                                                                  •
                Y = ASC(MID*(Z*, 2, 1))
                                                                          POKE S+1,0
                IF Y < 65 THEN Y=0
                                                                                                                  •
•
       602
             X = X + M + (I=37) / 2
                                          !Reset by suffix
             Y = Y * M * (I=36 OR I=37) / 2
                                           STREND and ARYTAB
                                                                                                                  •
             S = PEEK (109) + PEEK (110) * M
             I = PEEK (107) + PEEK (108) * M
                                          !While var not found..
       603
             IF PEEK(I) <> X OR PEEK(I+1) <> Y THEN
                I = I + PEEK(I+2) + PEEK(I+3)*M
                                                                                                                 •
•
                 IF I < S GO TO 603
                                           !..and still in spce.
                                          !Shift array space
                                                                                                                 •
             L = PEEK (I+2) + PEEK (I+3) + M
             FOR X = I+L TO S
                POKE X-L, PEEK (X)
                                                                                                                 •
```



Amstrad Interactive Cross-Referencing

Cross-referencing can be a powerful tool in program debugging. Crossreferencing listings usually provide a listing of the program, followed by a list of all the variables in the program and the lines on which they occur. This routine shows how to find a single variable and the lines on which it occurs, and is done by searching for the internal representation of the variable within the program. All Basic programs are tokenised, or converted into internal formats, called tokens.

On the Amstrad, Basic variables are coded, so that internally they are represented by the ASCII codes preceded by a prefix. This is 040000 for reals, 020000 for strings, and 01000 for integers. The code 0080 (in hex) is added to the code for the last character of the name. The structure of each line internally consists of line length (two bytes), line number (two bytes) and the coded text. A subroutine to find a single variable is given. The strange star character should be typed in as the \$ symbol for strings (I assume that the character used is the Czechoslovakian equivalent).

This routine could be used as the for a complete crossreferencing program.

•

•

•

•

•

•

```
560 line1=0
1 :jl=0:CLS
2 GOTO 500
                                                 570 bas #
                                                 580 WHILE PEEK(addr)+256*PEEK(addr+1)(>0
10 DIM a×(10)
                                                 590 POKE @length, PEEK (addr)
20 ax(0)=STRINGx(200,"#")
                                                 600 REM length:=(addr) (length(=255)
30 POKE @a×(0), PEEK(&170)
                                                 610 POKE @bx, PEEK (addr)
40 POKE @a×(0)+1,872
                                                 620 FORE @bx+1,PEEK(@addr)
50 POKE @a×(0)+2,81
                                                 630 POKE @b×+2, PEEK (@addr+1)
60 FOR j=1 TO LEN(a×(0))
                                                 640 POKE @line1, PEEK (addr+2)
70 PRINT HEXX(ASC(MIDX(ax(0),j)),2);" ";
                                                 650 POKE @line1+1, PEEK (addr+3)
80 NEXT
                                                 660 IF INSTR(3,bx,qx)()0 THEN PRINT USING
90 PRINT
                                                      "#####";i:nel;
100 FOR j=&172 TO &180
                                                 670 addr=UNT(addr+length)
110 PRINT HEX*(PEEK(j),2);" ";
                                                 680 WEND
120 NEXT
                                                 690 END
130 ENU
                                                1000 REM give an inner representation
500 DEFINT a-z
                                                     for the ax
510 INPUT "Give variable name",ax
                                                1010 qx=CHR×(0)+LEFT×(a×,LEN(a×)-1)
520 GOSUB 1000
530 REM qx contains an inner code FOR the name 1020 qx=qx+CHR×(&80 OR ASC(RIGHT×(ax,1)))
                                                 1030 RETURN
540 addr=&170:REM starting address
550 length=0
```



BBC List Formatter by B Carroll

MICROTEX 666

This program is available electronically through Microtex 666's software downloading service. It is accessed through Viatel page *66637*.

fairly self-explanatory, and was origi-

This program is well commented and | skip the perforations at the edge of | often be spoiled. listing paper. If the printer itself is set nally intended to make the printer to do it, word processor output can *RUN from disk.

The code produced should be

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```
unset
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LBA old wechv
STA 220E
                                                                                                                                                                                                                                                                                                                                                                                                                                    440
445
450
455
466
476
475
480
                                                                                          FILENAME S PRLIST
                                                                                                                                                                                                                        For 88C Hicro Mich BASIC I or II
                          100 RER FILENAME 5 PRLIST For 88C Micro. MEER 8H510 2 or 12 has been seen as a control character shall be seen as a contro
                            100 REH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Restore ald vector to bute
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           STA &20E
LDA old_wrchv+1
STA &20F
RTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   & the hi byte
Back to normal
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Intercept output & count CR's
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           STA temp
CMP #13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Save output character
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CMP #13
BNE test
LDA #8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              "If not CR test for I test rade
                                                                                                                                                                                                                                                                                                                                                                                                                                  190
195
500
505
515
525
525
536
536
556
556
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LDA #8
STA countcher
INC countline
LDA #56
CMP countline
BNE recover
LDA #8
                             155 HODE? @%=0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Reset character count
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Increase time count
56 print lines page
                             165 t*"Listing formatter for Canon PW-1080A'
178 PRINTTAB(0.1)CHR$130CHR$1%1t$
175 PRINTTAB(0.2)CHR$133CHR$1%1t$
•
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   To output routine if . St
                            189
185 PRINTIAB(0.4)CHR9134"This utility filters characters with"
196 PRINTCHR9134"Codes > 880 from the printer streem"
195 PRINTCHR9134"It also prints a gap of 10 lines after"
280 PRINTCHR9134"Every 56 printer lines to avoid the"
285 PRINTCHR9134"perforations of standard fanfold paper
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           STA countline
LDA #12
JSR output
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             else reset line count
.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        .
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 & send form feed
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Test character & replace Teletext codes by space
                           .
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AND #880
CHP #0
BED chars
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   test
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Check whether bit 2 is clear
If it is ASCII code 1 880
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        If not replace by a space
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Count characters sent to output
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    chers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           INC countrher
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Printer line is 80 characters
                                                                                                Set Fn Key 8 to list program (used only with *RUN PRLIST)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CMP countcher
BNE recover
INC countline
LDA #0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 If less than 81 go to output
else add to line count
                                                                                                                    LOX #(key MOD 256)
                            275
286
285
295
305
316
325
320
335
336
335
356
356
356
370
                                                               start
                                                                                                                                                                                                                        Nuse OSCLI to set Fn Key 6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            51A countcher
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                and zero character count
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Clear screen and write message
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Pecover stored character
& send to normal output coutine
                                                                                                                    LOA #12
JSR &FFEE
LOX #0
LOA bext.X
JSR &FFE3
INX
CNP #13
•
                                                                                                                                                                                                                           \Use OSWRCH for CL5
\Set counter for text
                                                                                                                                                                                                                                                                                                                                                                                                                                655
660
                                                                                                                                                                                                                                                                                                                                                                                                                                                               REM Temporary stores & strings
                                                            read
                                                                                                                                                                                                                                                                                                                                                                                                                                                              oid_wrchv=P% temp=P%+2
countiine=P%+3 countcher=P%+5
P%=P%+7
                                                                                                                                                                                                                   & output using Obmot.

until end of string
                                                                                                                                                                                                                                            & output using OSASCI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          •
                                                                                                                                                                                                                                                                                                                                                                                                                              675 | CountlinePX*3 | Countchar*PX*5 |
686 | RPPX*7 |
685 | Sept. | Sept. | Sept. | Sept. |
686 | Sept. | Sept. | Sept. |
687 | Sept. | Sept. | Sept. |
688 | Sept. | Sept. |
689 | Sept. | Sept. |
680 | Sept
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          •
•
                                                                                                                                                                                                                     Wait for En Key 8 to be pressed
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Point the WRCHvector to new code
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          •
                                                                                                                      LDA 820E
STA ald_wrchv
                                                                                                                                                                                                                         \Save old vector to byte.
                                                                                                                      LOA 820F
STA old_wrchv+1 \8 the hi byte
LOA #(new_wrchv NOO 256)
STA 820E \Enter new vect
                            375
380
•
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        STA countine SEA Local to Act Countine STA countine SEA C
                             385
390
                             395
400
405
410
415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •
•
                                                                                                                                                                                                                         Set line count to zero
Set then count to zero
West for printer stream
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •
•
                                                                                                                      Reset the WRCHvector to normal
```



Amstrad Toolkit

by J Moffitt

This Basic Toolkit loader program contains many data statements which are followed by a checksum. At the end of the listing, there is a general checksum which checks all the others. If a mistake is found in the program, it will stop with ERROR IN DATA AT LINE xxx; you must then edit that line and change the mistake. When is it POKEd into the RAM, the program may be saved and erased.

To start the toolkit type CALL 40000, which produces the usual message with some special additions. This message can be deleted with a higher call to the RAM (CALL 40003). The program can be saved by typing SPEED WRITE 1:SAVE "BASIC TOOLKIT" [ENTER]. To reload, type SYMBOL AFTER 32:RUN" (only characters after 32 may be redefined). The program can save at 4000

baud if TURBO is added to the previous command.

To check each block of the program, type CAT and rewind the tape to the correct place, then press PLAY.

The Amstrad CPC464 has a feature to add extra commands called RSXs (reserved system extensions). They are prefixed with a I,[SHIFT]&@.

The ROM must know the location of the command table, and must have a four-byte buffer. The command table contains the addresses of the commands, the name table contains the names. Fig 1 is a rough example in assembly language.

Where an @ appears this must be added, or the system may crash. IDPRINT must have a \$; IDPRINT,"HEL-LO" will not do. The commands using variables not prefixed with @ can be

entered with the value rather than the variables; ISCROLL,2 will do. If there are mistakes after the first run-through, the code should be reloaded. Any incorrect spellings will upset the machine and Basic can not be recalled. If a REM statement contains an RSX I, you must use II as a single I is deleted.

The following information is important:

 \times %=PEEK (45512).....This will set \times % to the present mode number.

×%=PEEK (46311).....This will set ×% to the value of shift lock, 255 on.

×%=PEEK (46312).....This will set ×% to the value of caps lock, 255 on.

 \times %=PEEK (45711).....This sets \times % to the present ITPATTERN value. \times %=PEEK (45712).....This sets \times % to

the present IBPATTERN value.

```
Code assembled $40000 (Any origin will do
                                                                                                                                                                        Code assembled #48080 (Any origin will do?)

Declare buffer address

Declare command table address

Call routine to set up the RSX commands in KOM.

Return to Basic.

Define 4 spaces of machine buffer.

Tell the machine where the names are.

Jump to the second command.

Set all the command values.

Declare the command rame, except the last character.

Add B8 (HEX) to the last character in the command.

Define the second name.

Add B8 (HEX) to the last character.

Define all the command names.

Tell the computer where to end.

Normal machine code routine start here.
                                                                                               LD HL,buffer
LD BC,comtab
CALL %BCD1
RET
DEFS 4
DEFW nmetab
Jf command1
JF command1
   •
  •
                                                                                              DEFB E +&80
DEF$ BNAM
DEFB T +&80
DEF$ ...
DEF$ ...
  •
                                                                                                ..... Second command.
                                           command2
                                                                                                  ...... Define all the other commands...
                           Fig 1 An assembler version of the command table
                                  COASUM. Upp capitals coil on COASUM. Upp capitals coil on COASUM. Upp capitals coil of COASUM. Upp capitals coil on COASUM. Upp capitals coil on COASUM. Upp capitals contour or MOUTHORF. Upp capitals contour or MOUTHORF. Upp capitals contour out.
 •
                                   Ed.

AIR MELLO THIS IS DUBLETIC STUFFRING sair of 1.10

IRESEL. Reset to the default colours mode.

ICUI OUH, X. Lhanges graphics colour.

IFBUTCHS, X. Flaces a character at the graphics curser.

IFBUTCHS, X. Inces any character on the screen, including cortrol codes.
 •
                              ITAGORN, ... Flaces a character with screen, including cirrol cooks for thicks any cheracter on the screen, including cirrol cooks for this fellowing cirrol cirrol
•
 •
                                                                                                                                               recer.
Heets the Payboard, to the default, all function Fevs.
Heet.
                                 •
•
```

```
188 REM
118 REM MSK EXTENDES MANIC LOADER
128 REM (C) 1985 Justin Moffitt
188 REM (C) 1985 Justin Moffitt
188 RIGE Ziccount-WINDERV 2000
188 FOR value-48888 TO 4000 STEP 22
       FOR place=8 TO 21
FOR place=8 TO 21
READ number 9
POKE value-place,VAL("&"+numbers)
summum+VAL("&"+numbers)
 288 PDKE value+place,VAL("%"
18 sum=sum+VAL("%"+number8)
228 NEXT
238 READ 15:main=main+VAL(10)
248 IF VAL(10)<0-bus THEN 748
258 count=count+18
268 METT
738 END
748 PRINT "ERROR IN LINE":count+288
                                                                                                                                    •
```

•

•

•



ş

VZ Pause

VZ Pause is a short routine for the VZ-200 which enables the computer to be 'paused' at any time. A pause can be initiated by pressing Shift-X. A short beeb will be produced to confirm that a pause has begun and pause can be terminated by pressing Shift-C, and again a short beeb will confirm this. The routine uses interrupts, and so will work with any software that does not disturb these

interrupts. To use, type in the routine, and then CSAVE it immediately, as the program self-destructs when run. When the program is run, the pause facility becomes operational.

The program works in the following fashion:

- Lines 10-20 lower the RAMTOP to create space for a short machine language program
- Lines 30-40 set the address for the interrupt exit
- Lines 50-80 POKE the machine language program into the memory
- Line 90 makes the interrupt operational
- Line 100 clears the Basic routine from memory. This is necessary to prevent the system crashing should the routine be RUN twice.

```
10 TM=PEEK(30898)*256+PEEK(30897)-35
20 POKE30897, TM-INT(TM/256)*256: POKE30698, INT(TM/256)
30 TM=TM+1
                                                                                    •
40 POKE30846, TM-IRT(TM/256)*256: POKE30847, INT(TM/256)
50 TM=TM-65536
                                                                                    •
60 FORA=0T031
                                                                                    •
70 READB: POKETM+A.B
80 NEXT
                                                                                    •
90 POKE30845,205
                                                                                    •
100 NEW
110 DATA33,150,0,1,70,0,58,251,104,254,121,192,205,92,52,58,251
                                                                                    •
120 DATA104,254,115,32,249,33,200,0,1,60,0,205,92,52,201
```



Commodore 64 Stock by PA & DC Stanford

MICROTEX 666

This program is available electronically through Microtex 666's software downloading service. It is accessed through Viatel page *66637#.

This program provides a simple stock control program for small shops or businesses and individual use. The operation of the program is fairly self-explanatory and all data entry is fully error-trapped. The program deals with stock and re-order levels, cost and selling price, stock value, re-order value, and can pro-

vide printouts either alphabetically or by part number.

All control codes in the listing have accompanying REM statements to explain their purpose. The program is written to run with a Commodore MPS 801 printer, but could easily be adapted, not only for other printers, but also for other computers. The

program is intended for use with a disk drive, but could be modified to work with a cassette by changing all references to 'disk' to read 'cassette', and by substituting the following lines:

10080 OPEN 1,1,0,FI\$ 12090 OPEN 1,1,1,FI\$

```
1141 IFRPS="'THEN1148
1142 IFRSC(PFS)C46CRRSC(RPS)C57THEN.148
1143 REM CLR-BLK
1159 PRINT*[CLS118K1*]-PHS(M) + -PES(M)
1159 PRINT*[CLS118K1*]-PHS(M) + -PES(M)
1159 PRINT*[CLS118K1*]-PHS(M) + -PES(M)
1159 PRINT*[CD15TOCK LE.EL */SL(M)
1169 PRINT*[CD15TOCK LE.EL */SL(M)
1169 PRINT*[CD15TOCK LE.EL */SL(M)
      •
                                                                                                                                 READY.
                                                                                                                                                 REMARKANASTOCK.................
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         •
                                                                                                                                                          сы.
REпеreteración (2007) выперенения
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1160 PRINTICOISTOCK LEVEL ".SL.(H)
165 PRINTICOIRCORDER LEVEL ".RE(N)
1179 PRINTICOIRCORDER LEVEL ".RE(N)
1189 PRINTICOIRCORDER LEVEL ".RE(N)
1189 PRINTICOICCOIT PRICE S CP(N)
1189 PRINTICOIRCORDER LEVEL "S.PP(N)
1199 PRINTICOIRCORDER LEVEL "S.PP(N)
1199 PRINTICOIRCORDER CONTROL IS THIS ENTRY CORRECT (Y/N)"
1210 GETAS :FRAS-"THEN1218
1210 GETAS :FRAS-"THEN1218
1220 IFAS-"N-THEMPRINTI [CLSICOIRFDIENTR: MANSER .N PRINTI(HH)";PNS(N) OUT01106
1225 IFAS-"N-THEMPRINTI [CLSICOIRFDIENTR: MANSER .N PRINTI(HH)";PNS(N) OUT01106
1226 MEXTN
1240 FISH
1250 GOTOSS
1260 RETAS-SS
1270 RETAS-SS
1271 RENCLE-BLU
1272 GOTOSS
1271 CLSICSLINON MANY ITEMS TO RDD ";TPS
1273 GOTOSS
1272 FRANCER-BLU
1274 GOTOSS
1274 FRANCER-BLU
1275 GOTOSS
1275 FRANCER-BLU
1276 GOTOSS
1275 FRANCER-BLU
1276 GOTOSS
1275 FRANCER-BLU
1277 GOTOSS
1275 FRANCER-BLU
1278 GOTOSS
1275 FRANCER-BLU
1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         •
                                                                                                                                                    REM
PEMPPPPALDQ STANFORD 1385######
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         •
                                                                                                                                 9 REM-
                                                                                                                              10 CLR DINFH(255)/PN#(255)/DE#(255)/SL(255)/RE(255) OF LLL TH DIS
11 DINZA(255) DK(235)
                                                                                                               10 CUR DIMPHOSSO, PHECESS, DESCESS, BLIZSS, RECESS: 19
11 DIMPHOSSO DIXCOST
13 PROPERTY OF THE PROPERTY OF THE
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2192 IFCP$=""THEN2190
2194 IFASC(CP$)<480RASC(CP$)>57THEH2190
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2195 CPK) HEWING (CPE) IFRSC(CPE) CASORRSC(CPE) STYTHERL198
2197 REP RED 28CRD
2198 IFRSC PEP 28CRD
2198 IFRSC PEP 3 PROBLEM PROBLEM
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1148 INPUT (RDDIEDDIEDDENTER FETALL PRILE ... NEW
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4279 REM RLK
4280 PRINTIEMIRETAIL PRICE - 8";RP(AK)
4290 DETRE: IFRA="THEM4290
4290 REM FIR
4391 REM CRU
4394 REM CRU
4395 PRINTICUI"
4395 PRINTICUI"
4396 REM RED-CRU
4310 INPUT-ERDICUIRETAIL PRICE - '8",RP(AK)
4310 REM PRINTIPULICUIREDIFI TO RETURN TO MENU
4310 REM BLU
4310 REM BLU
4310 GETRE: IFRE= "THEM4370
4317 REM FIRE= "THEM4370
4317 REM FIRE
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3000 REMBROWERPLENTSHOODEPLETERROWS
3010 IFFI-ETHENSO
3015 REM CLR-BLU
3019 REM CLR-BLU
3020 PRINT*[CLS]IB_IENTER PART NUMBER (E) R:009)
3020 DETAR IFAR— THENSE2
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3027 BEM REDE - 2008R
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3027 REN REDE 2008
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5180 GOTOSB
6000 REMPREHEND CURRENT STOCKHEEDWARD
6304 COSUSSOSO OSUSJOSOO REA SORT
6305 OPEN, 4
6006 PRINTHE, 5
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6008 PRINTHE, 5
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5818 LOSE4:00SUJA2000
5818 LOSE4:00SUJA2000
5818 LOSE4:00SUJA2000
5820 RETURN
5818 LOSE4:00SUJA2000
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58000 RETU
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8858 ONROCTOSS68,9868
8868 IFF5=1THENRETURN
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8678 PRINT*CBKI SORTING.... PLEASE HAIT!*:
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8971 ZY=99998

6972 FORP=170BN

9873 ZN(P)=PN(P) - NEXTP

8875 ZY=PN(1)+1

8889 FOR1=110EN

8885 FORN=11CEN

8885 FORN=11CEN

8886 FEZKN) CZYTHENZY=ZR(N) Zh(I)=N

8889 MEXTH
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8091 ZR(P)=999999
8892 ZY+99998
8094 NEXTI
8095 F5=1-F6=0 RETURN
9000 IFF6=1TRENRETURN
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20020 PRINT"EMXICCDICDICDI
20030 GETAS IFAS="THEN20230
20039 REM FI
20040 IFAS="[FI]"THENZUN
20049 REM F3
20050 IFASC>"[F3]"THEN20030
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                                                9004 PEM BLK
9005 PRINTFIBEL SORTING.... PLEASE WAIT!"-
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                                                9006 FORI=657090
                                                9009 FORN=1TOEN
9010 IFRSC(DE$(N))=ITHENZA(P)=N P=P+1
                                          9018 | FRESCRESCRED | THEMZACP) = N PPP+1
9028 | NEXTH
9038 | NEXTH
9039 | NEXTH
9039 | RETURN
9039 | RETURN
9039 | RETURN
10390 | RETURN
10330 | RETURN
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42040 RETURN
41000 REMD####TOTAL STOCK VALUED######
 41018 TC=8:TR=8
41028 FORNN=170EN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     41928 FORNNHITOEN
41938 TOETHOCKPCHN-SL(:A))
41845 TRATA-(RPCHN-SL(:A))
41845 TRATA-(RPCHN-SL(:A))
41850 DEFEN,
41865 DEFEN,
41865 DEFEN,
41865 PRINTS4,
41865 PRINTS4,
41865 PRINTS4,
41865 PRINTS4,
41865 PRINTS4,
41868 PRINTS4,
41869 PRINTS4,
41860 PRINTS4,
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12000 FRINT CODICOLICOLICOLICOLICOLICOLICOLICOLICRICRICRICRICRICRIPRESS SPACE
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APC is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs please include a cassette or disk version of your program, brief but comprehensive documentation, and a listing on plain white paper — typed if you have no printer.

Please ensure that the software itself, the documentation and the listing are all marked with your name, address, program title, machine (along with any minimum requirements) and — if possible — a daytime phone number.

Check through the previous Program listings to see the kind of programs we prefer. As a rough guide, original ideas are always welcome, as are good implementations of utilities and applications. Obviously the programs should be well-written, easy to understand, and preferably not too long (remember that other readers have to type them in).

All programs should be fully debugged and your own original, unpublished work.

We prefer to receive programs with a maximum 80-column width printed in emphasised typeface.

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CHIP CHAT



Memo from marketing To: The hand-picked team

Re: The great and secret anniversary push

Well, strange as it may seem, we survived the Christmas rush — or perhaps spavined shuffle would be a better description — and following the grand vizier's examination of the entrails on the top floor, it turns out that celebration is in order.

(Except for the sales manager, of course, whose metaphorical entrails they were.)

It transpires that, having bent its brains to the problem of counting up to 60 without removing its collective shoes and socks, your board has calculated that our fifth anniversary occurs next month. And naturally enough, it has asked me to run some ideas up the flagpole and try to improve our chances of surviving the next five years — or five minutes, come to that.

Well, where have we been in the last five years? Back in 1981, we were selling clapped-out-8-bit computers at grotesquely-inflated prices. Now we are selling clapped out sort-of-16-bit computers at even-more-grossly-inflated prices (thanks to inflation). Plus ca change, plus c'est la same old rubbish, if you ask me.

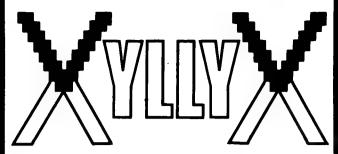
But how to celebrate this great anniversary that I have 10 minutes' notice to promote? Simple. The motif is cables...

Think back and you will remember that five years ago, we were shipping wonderful systems with Z80 processors, 64k RAM, WordStar, and all that sort of stuff. We were also shipping printers like the Diablo 630 and 1640, which could be used for ballasting the QE2, and also vibrated themselves along the table and into the WPB unless watched carefully and sandbagged in. And NB: we did not supply a cable that connected them.

Those were the days. Caveat emptor, or caveat sucker as we used to call it. Give 'em the machine, give 'em the printer, and then refuse to take phone calls when they panicked about plugging one into another. And then, and then, sell 'em the cable they needed for \$80 and make sure it didn't work properly?

It brings tears to my eyes, thinking of the bank balances we got out of putting right the things we'd done wrong. And we didn't even have to do them wrong on purpose; micro engineers, on the wages we paid in 1981, could be guaranteed to connect every wire in every cable to every other at random to find out if something worked.

Wouldn't it be nice to say: 'We give you all the connections you'll ever need' and then add: 'We also sell computers' in brackets? Along with photos of all the beautiful cables we produce at prices that would make Getty think twice, we've already proved that



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We've just become the Australian distributors for the highly popular XyllyX Videotex packs. With the product line we made a scoop purchase of packs at such low prices that we can make an introductory offer to you at almost half the the regular price.

These packs are brand new and fully warranted. They contain everything you need to connect to Viatel's Videotex service and/or to a range of databases & bulletin boards. Included is a Sendata 1200/75 plus 300bps modem with handset; power supply; data cable and Multicom or XyllyX (depending on model) software. The Apple models also include a serial interface card.

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customers don't care what hardware they buy they buy ours, after all — so our unique selling point must be the bits of wire. And don't mention software, for God's sake: we've still got half of the

buyers convinced that we actually wrote WordStar

and let them use it out of charity. No, it's got to be something concrete, marginally useful and ruinously expensive, and cables qualify on every count. So does the chairman of course, but that's another story . . .

Please eat the last paragraph after reading, and think ribbons and PVC sheathing!

Yours entangledly, Charles



This is the lady (?) who concocted the press statement headed 'Learn to mate from any position'. Not surprisingly she (Wendy Giles) works for Dick Smith Electronics — a company known for its vast array of electrical, and other, devices.

This month, Wendy gets APC's irregular 'Irreverant Press Release' award. And while she gets nothing else except brick-bats, the most inventive reader with suggestions as to the likely content of Wendy's press statement will receive a 12-month subscription to APC.

Send your inventions to Irreverent Suggestions, The Editor, APC, 2nd Floor, 215 Clarence Street, Sydney 2000.



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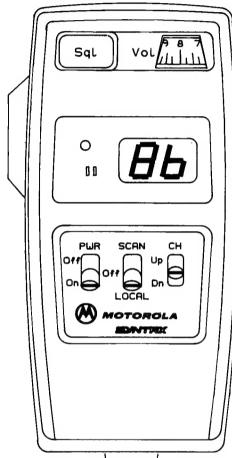
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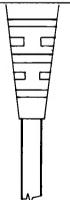
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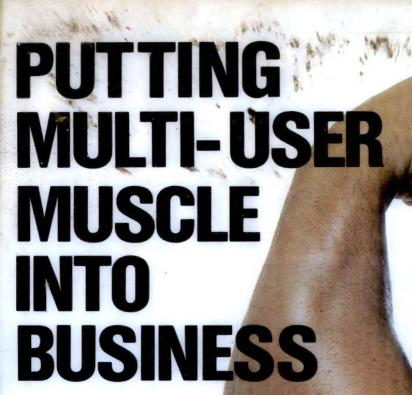
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